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JULY
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MINING CONGRESS JOURNAL

Vol. 27 JULY, 1941 No. 7

On a recent trip across country, with a quick "look-see" at some of the major mining districts, the editor found mining men profoundly concerned over the problem of securing maintenance parts, supplies and new equipment. While the Priorities Division of OPM has already given preference ratings in some instances and for some classes of equipment, mines as a whole will have to depend more and more on rebuilding and repair.

Particularly opportune, therefore, is the article this month on the uses of oxy-acetylene methods in maintenance and repair at mining plants, by H. C. Stelling, page 24.

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Front Cover: A striking view of the bucket line end of South Platte Dredging Company's dredge at Fairplay, Colo., with a capacity of 17,000 cu. yds. per day. Photo by Thos. J. Barbre, Denver.

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Opinions expressed by authors within these pages are their own, and do not necessarily represent those of the American Mining Congress

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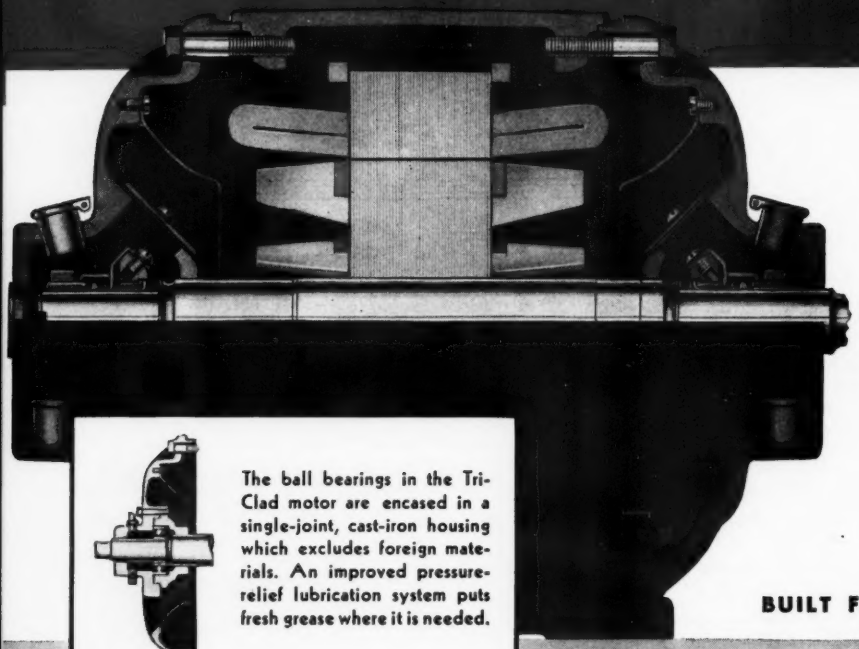

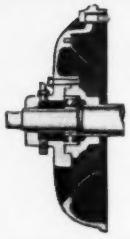

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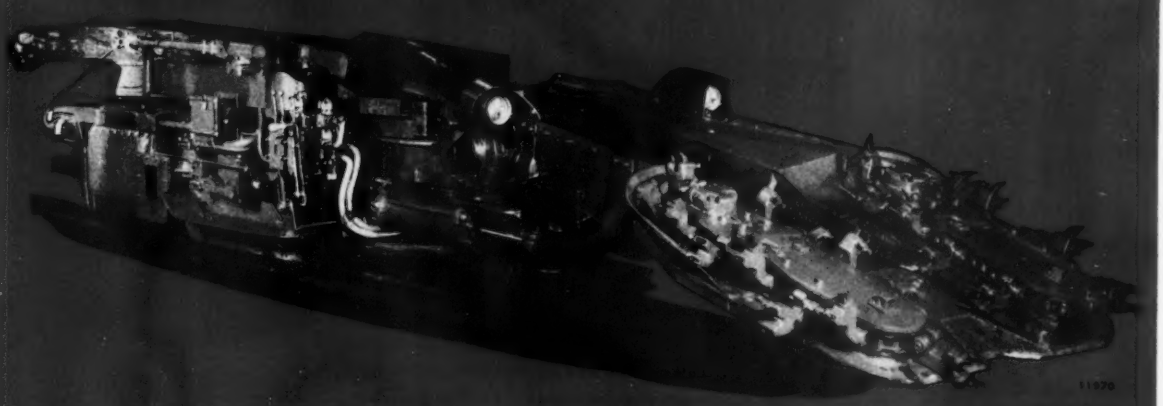

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Besides wearing the groove, there is also the wearing of the sheave hub, causing a wobbling of the sheave, allowing flange wear on the rope, which might also throw out the rope reeving alignment.

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For further information on the above, write for "Rope Dope," our educational bulletin which is published at frequent intervals.

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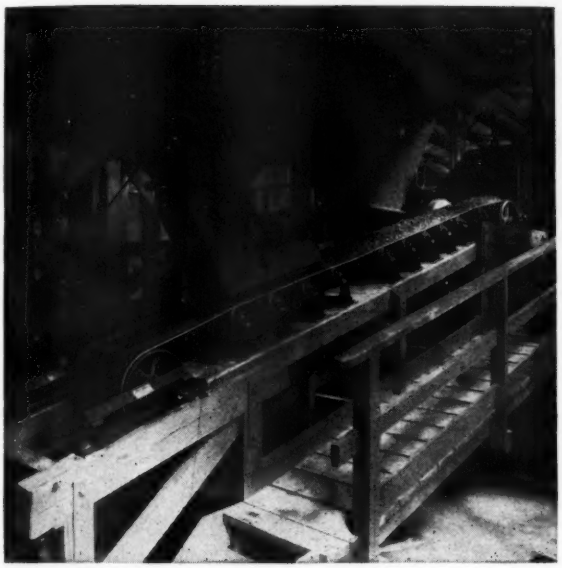

← Conveyor No. 1 discharging to 36-in. wide picking belt conveyor No. 2. This view also shows conveyor No. 3 which receives fines from grizzly.

← 20-in. wide conveyor No. 7 from mill ore bin to ball mill.

Motorized reducer and roller chain drive of conveyor No. 2. →

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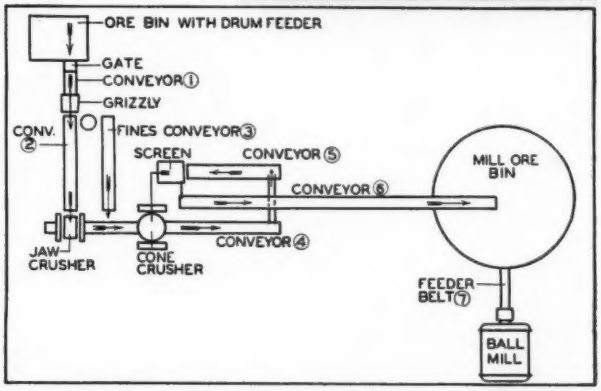

1. Conveyor from ore bin to grizzly. 2. Picking belt conveyor. 3. Conveying fines from grizzly. 4. Conveying from jaw crusher. 5. Conveyor to vibrating screen. 6. Conveyor feeds mill ore bin. 7. Conveyor from mill ore bin to ball mill.

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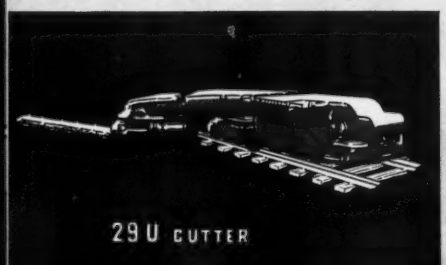

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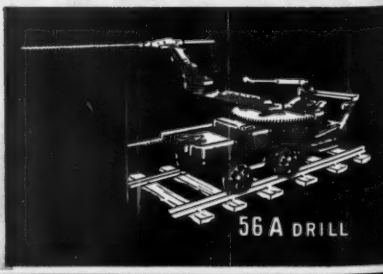

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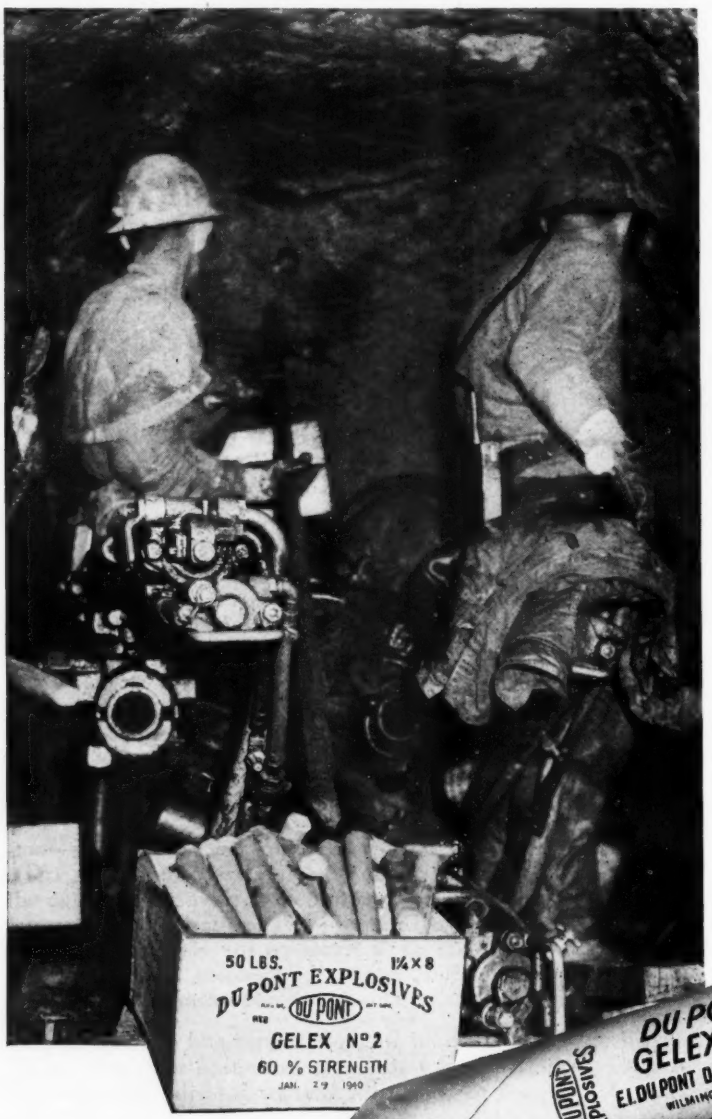

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A JOURNAL FOR THE ENTIRE MINING INDUSTRY—PUBLISHED BY THE AMERICAN MINING CONGRESS

MINING CONGRESS JOURNAL

RUSSELL C. FLEMING
Editor

Vol. 27 JULY, 1941 No. 7

FEDERAL MINE INSPECTION

THE Federal Coal Mine Inspection Bill became law on May 7 when it was signed by the President. In this act "the Secretary of the Interior, acting through the United States Bureau of Mines, is hereby authorized and empowered to make or cause to be made annual or necessary inspections and investigations in coal mines, the products of which regularly enter commerce or the operations of which substantially affect commerce . . ." for the purpose of promoting health and safety in coal mines. As a result of these inspections and investigations the Bureau may make recommendations, but enforcement powers remain with the official mine inspection or safety agencies of the several states and territories.

On July 3, the Second Deficiency Bill, 1941, was signed by the President, providing $729,000 to implement the act for the current fiscal year, and, in some parts, for nine months only. The inspection service is to be organized and administered as a division of the Health and Safety Branch of the U. S. Bureau of Mines. A force of 107 senior inspectors, inspectors, associate inspectors, and assistant inspectors are to be employed, plus five mining engineers particularly experienced in electrical inspection, and a similar number experienced in explosives work and inspection. Laboratory and analytic facilities will also be provided. These funds now available for the inspection division for one year amount to more than twice the total allotment for the entire Health and Safety Branch last year, and almost twice the Branch allotment for the current year for all purposes other than the new activity. In other words, the inspection division in size and no doubt in importance, may soon overshadow all other combined activities of the Branch.

The avowed purposes of the act are wholly praiseworthy, it goes without saying. The American Mining Congress has consistently felt that best results would, in the long run, be obtained by a voluntary cooperation among the various safety agencies and the industry. Over the years cooperation and mutual confidence have been built up among the Health and Safety Branch, mine operators and labor, and state inspection services. In the graphs of fatality rates there have been peaks, as last year, and there have been valleys, but the long-time trend has been decidedly downward. Had this additional amount of money been provided for the already-established activities of the Health and Safety Branch, achievements would have been commensurate with the cost. The inspection division introduces new problems and possible sources of friction, as well as of political pressure, that had already been worked out and eliminated under the established procedure.

Not the least of these problems is the possibility of conflict with state inspection services. State mining codes vary, to cover different and regional conditions. Enforcement of the codes has admittedly not been uniformly rigid in the several states, and good may come from this new Federal activity through a moral effect in raising standards in state inspection services. But complications will arise; some underground practices may be permitted by code in one state, and prohibited in another. Will a Federal inspector condone the practice in one state that is prohibited elsewhere? Labor organizations have worked for passage of this bill; to what extent, if any, will the Federal inspection service become an instrument in the hands of labor leaders?

These and other pitfalls must be considered. The Bureau, over a long period, has proved that it is capable of strong, unbiased administration and it has now the best wishes of the entire industry for what is necessarily a complicated and difficult duty.

PRODUCTION AND PRICES

IT IS pertinent to ask now whether the present price control system is working equitably. In the last war, by the "Baruch Plan," all commodity prices were frozen as of a certain date and later adjustments were made, in cases of inequity, on appeal to the price-fixing authority. Control now in effect has been based on the theory that if prices of basic raw materials, such as zinc, copper, steel, lead, etc., were held in check, prices along the line of production would also stay put.

As the present plan develops, the mines, producers of many of the basic raw materials for which price is fixed, find themselves in an anomalous position. Costs of supplies, equipment and labor, particularly the latter, are in fact rising, and are beginning to press against the ceiling of fixed prices for the mine products. It seems reasonable to expect that wages and other items of cost should also be frozen for the length of the emergency. You cannot have a successful price control system which is half-fixed and half free.

The country needs additional production, which can come principally from marginal and sub-marginal mines only. To obtain this additional production, the government could subsidize with a higher metal price the high-cost mines—a plan that is now under consideration for some of the copper mines of Michigan and the western states. In that case, one encounters immediately the difficult and complicated task of determining a division among those mines to be subsidized and those to be considered as normal producers and not subsidized, particularly since mines now breaking even may soon need to be considered sub-marginal. As an alternative, some metal prices could be allowed to seek a more natural level, still with restraint against undue increases. This would, no doubt, bring out increased production and without the necessity of determining in each case whether a mine is sub-marginal or not. The latter plan is most simple from the industry and administrative points of view, but it is contrary to the present price administration policy.

But whether or not subsidies to high cost producers are allowed, it is becoming increasingly evident that wages and other items of cost will have to be frozen, too, if the inflation Leon Henderson is trying to avoid is in fact prevented.

General view of the surface plant of Rosiclare Lead and Fluorspar Mining Company, Rosiclare, Ill.

UNWATERING THE ROSICLARE MINE

After having been under water since 1924 the Rosiclare fluorspar mine at Rosiclare, Illinois, has been unwatered for further mining operations, using Pomona deepwell pumps. A new power plant has been provided and Cameron pumps also installed. Total pump capacity will now care for all inflow.

By A. H. CRONK
Superintendent, Rosiclare Lead and Fluorspar Mining Co.

THE mining properties of the Rosiclare Lead and Fluorspar Mining Company are located in Hardin County, Illinois, and Crittenden County, Kentucky. These two counties ship more than 80 percent of the fluorspar produced in the United States. The Rosiclare Lead and Fluorspar Mining Company has been the oldest and largest consistent producer of fluorspar in the world.

History of Operations

Mining operations have been conducted on the Company property for the past 90 years. Mining operations in the early years were for galena, found in shallow depth along the Rosiclare vein. Fluorspar was produced in small quantities beginning about 1870. The importance of fluorspar in the metallurgical and ceramic industries gradually developed from year to year and, by 1900, the fluorspar deposits in the district had been partially developed. There has been a steadily marked climb in fluorspar output since 1907, fluctuating with business conditions and production of open-hearth steel. From the early log-washer operations, modern efficient mills have been developed, employing gravity and flotation milling. The hand windlass has given way to electric and steam hoists with efficient mining methods.

Fluorspar occurs in faults in the Rosiclare District and as replacement bedded deposits in the Cave-in-Rock District, which is about 15 miles east of Rosiclare. The country rock is principally Mississippian Age consisting of sandstones, shales, and limestones. The area is considerably faulted with the major faults having a northeasterly strike and crisscrossed by connecting faults. The displacements of the faults varies from a few feet to 1,500 ft. However, the known mineralized faults from which the major portion of fluorspar is produced have a displacement from 100 ft. to 300 ft.

The production of fluorspar in the Rosiclare District comes from four mineralized faults; named in order of importance they are Rosiclare, Blue Diggings, Daisy, and Argo faults. The Rosiclare vein is the most important in regard to length and width of orebodies. Mining operations have been conducted over a length of three miles on this fault. The faults influence the underground drainage—developing surface sink holes in the limestone formations.

Plant of the Rosiclare Company

The plant of the Rosiclare Lead and Fluorspar Mining Company is in the corporate limits of Rosiclare, situated on the north bank of the Ohio River. The Rosiclare mine of this company, developed on the Rosiclare vein, has a main or plant shaft 720 ft. deep. This shaft serves the mill; ore is hoisted directly from mine ore pocket to the mill bin. The Rosiclare Shaft, 535 ft. south of the main shaft, is 620 ft. deep and is used as a man and supply shaft. The 620-ft. level is the main haulage and drainage level. This level extends to the north 2,300 ft. and 1,200 ft. south of the main shaft. Shrinkage stoping is mainly employed and all ore mined above the 620-ft. level is passed through stope chutes and raises to this level.

Former Pump Installations

Prior to 1924, the Rosiclare mine made about 1,000 gallons of water per minute. A steam pump of 1,000 gallons per minute was located on the 420-ft. level. With subsequent deepening of the mine to the 620-ft. level, an electric-driven plunger pump of 1,000-gallon capacity was installed, pumping directly to the surface. A 1,000-gallon electric-driven centrifugal pump was used as a standby unit, relaying the water to the steam pump on the 420-ft. level. The 520-ft. level was also equipped with a large steam pump. All pump stations were adjacent to the main shaft. Development work on the 520-ft. level and 620-ft. level north of the shaft gradually increased the water inflow. Power was furnished by D. C. generators for operation of the electric pumps.

The steam plant at that time, 1923, consisted of a 500 hp. Stirling, two 300 hp. B&W, and one 300 hp. Heine boilers. These boilers operated on 150-pound steam pressure. The generating equipment was a 450 kw. Nordberg Uniflow unit and a 300 kw. Chuse engine generator, both 250 volt direct current. The hoist at the main shaft was a conical double-drum Nordberg-Corliss engine hoist.

In addition to the Rosiclare mine, the company operated the Daisy-Blue Diggings Mine about one-half mile north of the main plant. Production at that time was from the Daisy vein with development to the 400-ft. level. Subsequent mining after 1924 developed the Blue Diggings vein and the Daisy vein to depths of 800 ft. The hoisting equipment at the Daisy-Blue Diggings mine was a D. C. electric hoist.

The advance of the 620-ft. level of the Rosiclare mine north of the main shaft, during the fall of 1923, encountered an increased flow of water, taxing the capacity of the mine pumps. Fall rains and a high stage of the Ohio River combined with the underground water courses increased the flow from 2,000 to 2,800 gallons per minute. This necessitated the use of bailers in the shaft. The underground water finally reached a maximum of 3,500 gallons per minute in January, 1924. This flow was beyond the capacity of the pumps and bailers and decision was made to abandon the mine temporarily. The electrical equipment, storage batteries, locomotives, etc., were salvaged and the mine allowed to fill.

The Daisy-Blue Diggings mine was then developed more intensively and production was maintained from that source.

New Operation Planned

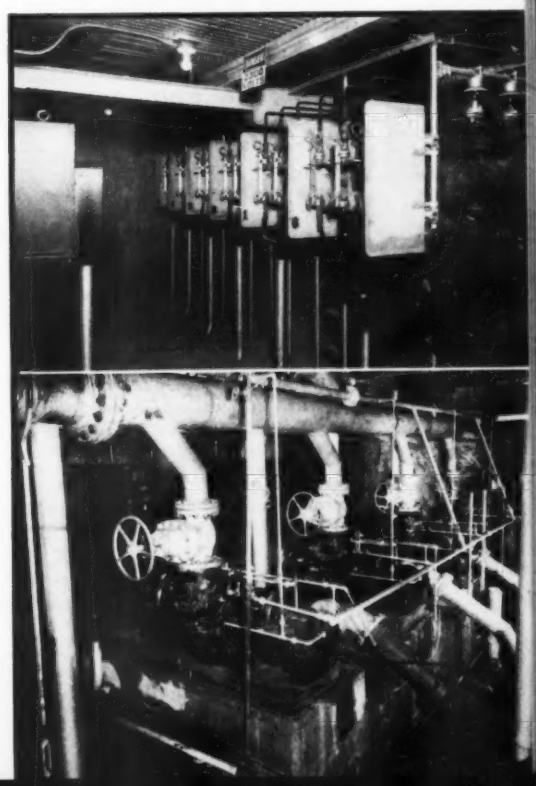
The direct current generators were changed to 2,300-volt alternating current units in 1927. This necessitated replacing all D.C. electric motors, as the mill is electric driven. The old power plant was very inefficient and inadequate for expanding operations. Decision was made in 1938 to construct a new power plant. The Baumes Engineering Company of St. Louis, Mo., power plant engineers, were employed to design and help select equipment for the power plant. This plan materialized and the new steam plant was completed in 1939. The power plant consists of two 600-hp. B&W boilers, set above the 1937 high-water stage of the Ohio River, one Allis-Chalmers 1,250-kw. and one 1,000-kw. Westinghouse condensing turbine units. The turbine generators were also installed above the high-water stage. The boilers have a modern setting with automatic control, chain-grate stokers, forced draft fans and are connected with a concrete chimney 185 ft. high. The 500-hp. Stirling boiler was retained and the old B&W and Heine boilers were scrapped. The Nordberg and Chuse generator units and the steam-driven air compressors were retained.

Rosiclare Mine Pumped Out

The water level in the Rosiclare mine after flooding fluctuated from 40 ft. to 70 ft. below the surface, according to wet or dry seasons. A 3,000-gallon, second-hand, Pomona pump, 280 ft. long, was installed in the Rosiclare shaft. The water from this pump was discharged through an 18-in. pipeline to the turbine condensers. The pump was regulated to hold the water to 200-ft. level in the mine and furnished water for condensing purposes. The temperature of the mine water was 60° F. and made an excellent source for condensing water.

Now having adequate power, consideration was given to dewatering the Rosiclare mine to the 620-ft. level. A new 3,200-gallon-per-minute Pomona pump, 640-ft. long, driven by a 600-hp. 2,300 volt motor was purchased and delivered in May, 1940. This unit, according to the manufacturer, is the largest pump of the deep-well turbine class ever constructed in reference to volume and length.

As there was no sump in the Rosiclare shaft below the 620-ft. level,



Upper: Cutout switches, 620 level pump station

Lower: Pump installation, 620 level pump station, showing suction end of pumps

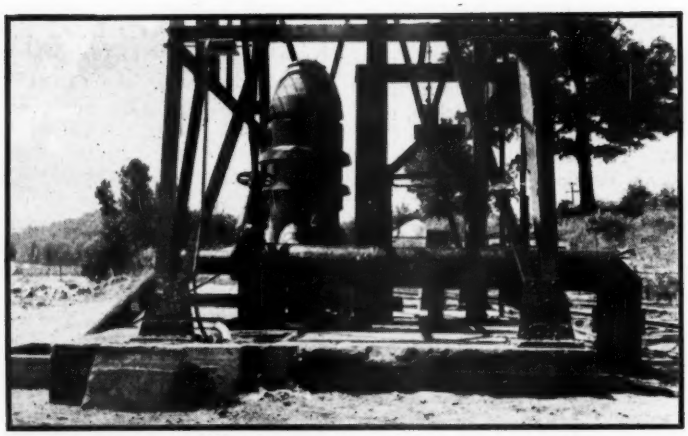
it was necessary first to install the Pomona pump in one of the hoisting compartments of the main shaft. Fortunately, no serious obstructions were encountered and the pump was installed in eight days. The total weight of the pump complete is 94,000 lbs. The discharge column is 16-in. diameter, extra heavy flanged 10-ft. sections. The diameter of the shaft is 3 7/16 in.; the 18 stages of the 18-in. bowl turbine assembly rotates at 1,160 r.p.m. The pump is driven by a 600-hp., 2,200-volt Westinghouse hollow shaft induction motor built into a unidrive pump head.

The dewatering program was to install the Pomona pump in the main shaft, clear the 620-ft. level and install in the pump station on that level four 1,000-gallon centrifugal pumps. Upon installation of the station pumps, the Pomona pump was to be moved to the Rosiclare shaft, after deepening that shaft below the 620-ft. level, for permanent installation. A drainage ditch was necessary from the main shaft to allow the water to flow to the Pomona pump at the Rosiclare shaft. Four Cameron centrifugal pumps, type 4 G.T. 1,000-gallon capacity, 700-ft. head, driven by 250-hp., 2,300-volt General Electric motors, were purchased from Ingersoll-Rand Company.

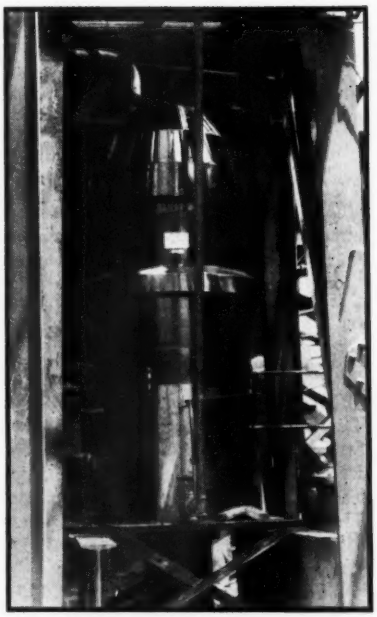
Pomona Pumps Operate Efficiently

The Pomona pump operated very efficiently under continuous service. It was put in operation June 4, 1940, and in 20 days, the water was lowered from 200 ft. to 600 ft. below the surface. Pumping 2,500 gallons per minute, it was maintained at this elevation as the water was used for turbine condensing water. An additional 500 gallons per minute were pumped from a shaft 150 ft. deep at the south end of the mine. This water came from a flooded adjoining mine through a natural water course at a depth of 150 ft. The summer of 1940 was exceedingly dry, which was of considerable advantage in the pumping operation. An additional unit was added to the cooling tower of the power plant so as to give maximum capacity of condensing water for the turbines, to be used as a standby should the mine water become too muddy for such use.

The water in the Rosiclare mine was lowered about 10 ft. below the 620-ft. level in October, 1940. Upon examination of the mine after 16 years under water the oak timbers were found to be in excellent condition.

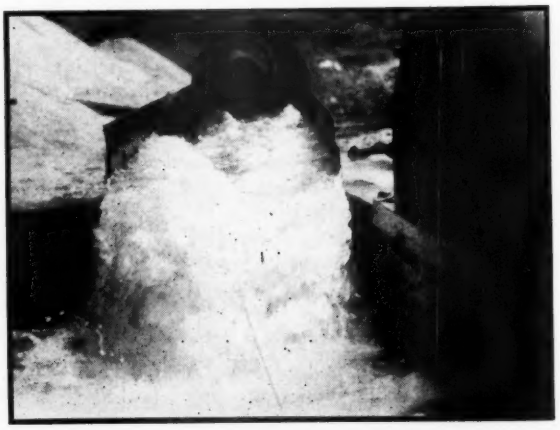


Above: 3,200 g.p.m. Pomona pump at the Rosiclare shaft



Above: 3,200 g.p.m. pump at main shaft

Considerable mud covered the 620-ft. level. Very few caveins were encountered in the level; however, heavy slabs of limestone rock were found on the 420-ft. and 520-ft. shaft stations. Work was started on retimbering the Rosiclare shaft and the main shaft and cleaning up the 620-ft. level. The old electric-driven plunger pump occupying the entire 620-ft. level pumproom in the main shaft was dismounted and scrapped. The old pumproom on the 620-ft. level adjacent to the main shaft was enlarged and the roof supported by steel I-beams. A drainage ditch was cut in the bottom of the 620-ft. level from the main shaft to the Rosiclare shaft and the former cistern of the old pump station was enlarged. The water flow from the north was confined in a 24-in. welded joint steel flume for a length of 250 ft., bringing the water past the ore pockets and shaft into the cistern. The cistern is provided with a gate so that the water can be either turned into the



Right: Pump discharge—2,500 g.p.m.—after passing through turbine condensers

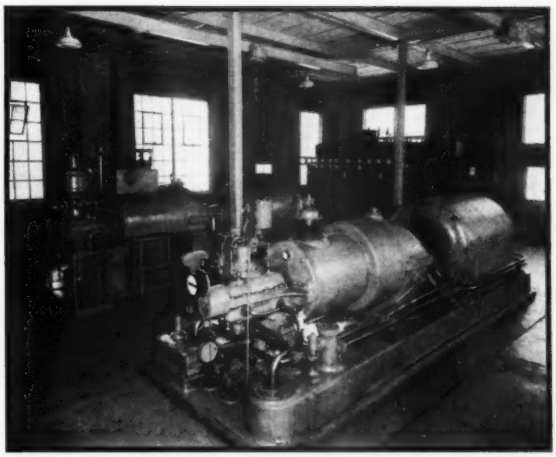
cistern or diverted to the drainage ditch leading to the Rosiclare shaft to be pumped by the Pomona pump. The old pumpline compartment of the main shaft was cleared of old water discharge and steam lines, but one 8-in. column found to be in good condition was retained.

Cameron Pumps Installed at Main Shaft

The four Cameron pumps were installed, each pump having a separate 8-in. suction into the cistern with footvalve. The pumps were set in a row and the discharge from each pump connected with a 12-in. horizontal header. All pipe joints were welded. The fabrication of the various pipe was made in the company's shops. A 12-in. discharge column with welded joints was installed in the pumpline compartment of the main shaft. The former 8-in. discharge column was connected into the 12-in. pump discharge header. This arrangement gives a 12-in. and 8-in. discharge column to the surface, where the two columns connect into a 20-in. header. From the 20-in. header, the water can be diverted to the turbine condensers or discharged into an open flume leading to the mill pond. The water after passing through the condensers also flows to the mill pond. The control equipment of the pumps consists of two General Electric Type CR-GIA manual reduced starters and two General Electric, Type CR-HIB, 2,300-volt automatic reduced voltage starters. This arrangement allows two of the pumps to operate continuously with the third and fourth pumps operating automatically, according to the flow of water.

Power for the station pumps is furnished through a three-conductor 350,000 cm submarine-type cable, manufactured by the Okonite Company. This cable is suspended in the pipe compartment of the shaft and connects with the buss bars in the pumproom and by cable to the power plant switchboard. The station pumps were put in operation in March, 1941, and found to perform satisfactorily.

The underground buss feeds six 2,300-volt circuits—four for the station pumps, one for three 75 K.V.A. General Electric 2,300-220/440-volt transformers, and a spare circuit. The disconnect switches from the buss bars are outdoor type General Electric, Type FA 101-7,500-volt 400 amperes. The 440/220 voltage is to be used underground for hoists, battery charging equipment, fans, lighting, etc.



Turbine room of power plant

By this time, the Rosiclare shaft had been deepened 60 ft. and the Pomona pump was moved from the main shaft to its permanent location in the Rosiclare shaft. On account of not having a large hoist at this shaft, it was necessary to utilize the company's switch engine for handling the heavy Pomona pump column. This was done by a series of snatch blocks and cable connected to the engine. The discharge from the Pomona pump connects with an 18-in. pipeline to the turbine basement with piping arrangement to utilize the mine water for condensing purposes.

Total Pumping Capacity Now 7,700 g.p.m.

The combined pumping capacity of the Rosiclare mine is now 7,700 gallons per minute—Pomona pump, 3,200 gallons; 620-ft. level station pumps, 4,000 gallons, and 500 gallons at the 150-ft. shaft at the south end of the property. Development work will soon be started on 620-ft. level and 720-ft. level.

The Rosiclare Lead and Fluorspar Mining Company produces all grades of fluorspar. The steel industry is the chief consumer, using approximately 70 percent of the entire production, usually in the form of gravel fluorspar analyzing not less than 85 percent calcium fluoride and not more than 5 percent silica. Between 1 and 2 percent, with a similar analysis, is used by foundries. About 15 percent is used in the production of hydrofluoric acid and analyzes approximately 98 percent calcium fluoride and 1 percent silica. The glass and enamel industry consume about 1 percent. This is shipped in the form of ground spar analyzing 95 percent to 98 percent calcium fluoride and not over 2½ percent silica. Approximately 2 percent is used in miscellaneous industries.

Mr. J. M. Blayney of St. Louis, Mo., is president of Rosiclare Lead and Fluorspar Mining Company.

Large Iron Ore Shipment

Shipments of iron ore from the Lake Superior region reached an all-time peak for any one month during May, when 11,081,199 tons were forwarded. Shipments for June amounted to 10,787,929 gross tons, a new high record for that month, exceeding the previous record made in June, 1929, when 10,174,435 tons were shipped. The previous all-time high was achieved in the month of August, 1937, when 10,811,381 tons were shipped. It is expected that July shipments this year will establish a new all-time record.

Total shipments for the first six months of the year amounted to 28,825,918 tons, which is far in advance of any of previous ore movements in any like period. Previous high for the season to July 1 had been made in 1937, when 23,922,294 tons were shipped.

Plan Adopted To Handle Bootleg Anthracite Problem

The Anthracite Emergency Committee has adopted a plan worked out by state officials of Pennsylvania, operating interests and representatives of mine workers, whereby the legitimate anthracite operators will buy, process and market the tonnage produced in so-called "bootleg" operations in the anthracite field. The plan also encompasses the ultimate elimination of the problem by having legitimate operators absorb in their mines those men now working in the bootleg holes.

Dayton dredge in operation

DAYTON'S DRAGLINE DREDGE

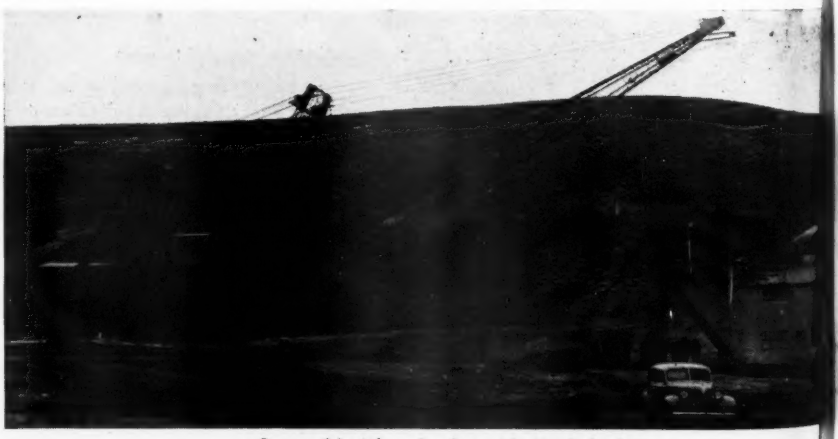
Handling 15,000 cu. yds. per day, the Dayton Dredging Company's equipment is the largest dragline dredge in use in the United States.

VIRGINIA CITY has dreamed of the past for nearly half a century, since the days of the Mackays, the Floods, the Fairs and the Sutros—of the Great Bonanza in particular and the Comstock Lode in general; of the days when $26,000,000 worth of gold and silver were produced annually from these mines. Now a dragline dredge has ended the idle dreaming. The city is sitting up and taking notice for the first time since the decline in the price of silver brought a reversal to her prosperity, around the turn of the century.

The dragline dredge, in operation at near-by Dayton, has many features new to the West, not the least of which is the unprecedented size of the units. The giant Bucyrus-Monighan has a 15 cu. yd. dragline bucket that looks as though it could pick up a car and put it into the 24-by-20-ft. dredge hopper for processing. The dragline is the biggest ever shipped west and the dredge is the largest of its type in the world. It can handle 15,000 cu. yds. of gravel per day, and the dragline can dig to depths greater than 100 ft.

This equipment is part of the operation of the Dayton Dredging Co., and is located on U. S. Highway 50, in the town of Dayton, Nev. The owners have secured the land underlying the town on the north side of the highway and look forward to three years of operation on 14,000,000 cu. yds. of ground. Now they are removing the buildings ahead of dredging.

Authorities have been placing limits on the size of dragline dredges, but Dayton Dredging Co.'s operation sets a new ceiling, and the question is now

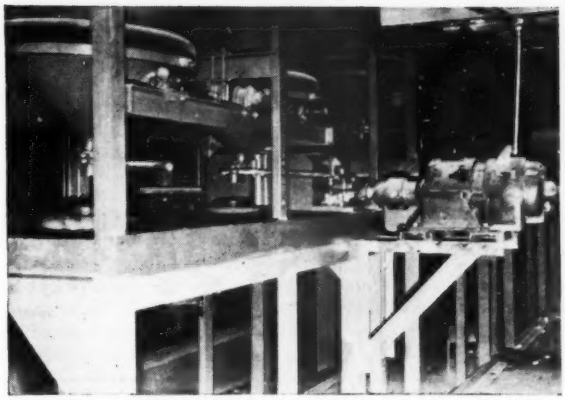


Bucyrus-Monighan dragline with 15-yd. bucket

raised whether even this represents the largest economic unit possible. The company is dredging to depths of 120 ft., whereas 30 ft. was formerly considered about the depth limit of the dragline dredge, and deeper deposits were left to the bucket-line type of equipment.

The washing plant is on a comparable scale. Built by Bodinson Manufacturing Co., the dredge has a hull with a deck 50 ft. 2 in. wide, by 106 ft. long; and it is 7 ft. 1½ in. deep. The hull is comprised of 13 pontoons. While its peak capacity is 15,000 yds. per day, it is averaging 300,000 yds. per month. Disparity between peak and normal capacity is due to loss of time between shifts, during clean-up and maintenance shutdowns.

Thirteen pontoon sections, such as this, constitute the hull



Sixteen Pan-American jigs make up a major section of the gold recovery plant on the dredge

Gold Recovery Equipment

It is not in size alone that the dredge is distinctive. It differs from others in many of the gravel-handling and gold-recovery features. Material is discharged from the receiving hopper through a 6-ft. diameter spout into the 9-ft. diameter by 60-ft. long trommel. Screening sections are installed on 36 ft. of the trommel's length, consisting of ¾-in. abrasion-resisting alloy steel screen plates. Perforations are taper-drilled, being ½ in. to ⅜ in. in the first 18 ft. of trommel and ⅜ in. to ½ in. on the remaining section. The trommel is driven at 6½ r. p. m. by a Westinghouse gearmotor.

The stacker is built in two sections, which gives flexibility to the operation. By this construction a portion of the tailings may be gated off the first section and deposited under water for better placement. Another advantage is that, when the dredge is working in shallower ground, the second section may be removed. The first stacker section is 105 ft. long, the second 85. Forty-two in. wide Pioneer conveyor belting is used, and individual drive to each of the sections at 300 ft. per minute is provided with Westinghouse 30-hp. motors. A gantry structure carries suspension cables which support the stacker.

A series of riffle tables are usually employed on a dragline dredge for recovering the values. On this operation, however, the large quantity of material which had to be handled in a relatively restricted area, plus the fact that a good proportion of the value is locked in the quartz, made it necessary to use an elaborate system of jigs, amalgamator, riffles, ball mill and more riffles.

Material passing the trommel perforations is split and diverted through launders to Pan-American rougher jigs. There are 16 of these units, arranged on either side of the centerline of the trommel in banks of four; they are 2-cell, 42-in. by 42-in. type. The hutch product of these jigs is delivered to a dewatering sand drag, which in turn takes the rough concentrate to a 2-cell, 42-in. cleaner jig. The sand drag is of conventional type: two 20-in. belts with steel scraper flights. Tailings from the rougher jigs are discharged onto the stacker belt from two 17-ft. dewatering sand wheels.

Hutch product of the cleaner jig goes to either of two destinations. From the first cell it is arbitrarily discharged to a Titan amalgamator; from the second cell it may be close-circuited back to the dewatering sand drag as a middling, or shunted to the amalgamator.

A Long Tom sluice receives the product from the amalgamator, and in this unit the values are recovered in augur-hole riffles, with material which passes being discharged to the sump of a ball mill sand drag. Dewatered concentrates are delivered from the drag to a 24-in. by 4-ft. ball mill, for finer grinding to permit a greater recovery.

A second Long Tom takes the material from the ball mill. This sluice is equipped with augur-hole riffles and traps with expanded metal over coco matting. Tailings are wasted overboard.

Pumping equipment is adequate to handle the operations. Pond water is circulated to the trommel by a Byron-Jackson dredge type pump of 7,000 gals. per minute capacity and powered by a 150-hp. motor. Another pump, of 3,000 gals. per minute capacity, supplies hutch water. A total of 24 motors and gearmotors, totaling 555 hp., operate the various dredge units. Water, a major obstacle to placer mining operations in Nevada, is secured from two sources. Dayton Dredging Co. has constructed a ditch and 8-in. pipe line from the Carson River for a portion of its supply; and gets the balance from tailing water of mills near Virginia City.

Another feature of the dredge is the extensive system of piping and controls to remove slime from the bottom of the pond. Slime is pumped into the system by an 8-in. mud pump and then discharged onto the stacker.

Walking Type Dragline Employed

The walking-type dragline is a 15-W, equipped with a 185-ft. boom and Ward Leonard controls. It has

The stacker, on the far right, is 190 ft. in total length and is supported by gantry structure

two hoist motors, each of 187½ hp., and twin swing motors of 125 hp. capacities. The two-part hoist ropes are 1⅜ in. diameter and have a speed under load of 275 ft. per minute. Boom hoist rope is 1¼ in. Preformed wire rope is used throughout, since this type has proved it will outlast ordinary rope by a good percentage under the gruelling service given it by the dragline dredge operation. From Superintendent Dan Avery on up to President Guy Standifer, the management of Dayton Dredging Co. is made up of men with long experience in the field, who select their equipment with care and an eye to low maintenance cost.

Some idea of the size of the dragline can be visualized by the shipping figures; it was transported from the factory in 34 carloads. With a weight of 1,700,000 lbs., its prototype is seldom seen outside the coal pits of the East and Middle West, where it is used for large-scale stripping.

The dredge is equipped for year 'round operation; it is completely enclosed and has a steam-heating plant for cold weather.

Chromite Deposits of Kenai Peninsula, Alaska

Deposits of chromite near Seldovia, on Kanai Peninsula, Alaska, have been known for more than 30 years, states a recent communication of the U. S. Geological Survey. During the summer of 1940 a party headed by P. W. Guild, of the Survey, spent three months mapping the chromite-bearing areas and studying the ore bodies.

The chromite occurs as bands or lenses in two masses of ultrabasic igneous rocks, which have intruded metamorphosed Paleozoic sediments. One mass is at Claim Point, which projects into the entrance to Port Chatham, about 20 miles south of Seldovia. It is readily accessible by boat, and even large ships can come in fairly close to the point. The second mass is at Red Mountain, 10 miles south-southeast of Seldovia, in the rugged Kenai Mountains. The deposits at Red Mountain occur at altitudes of 1,100 to 3,000 ft. above sea level. There are no roads into the area as yet, but a good trail extends from the mountain to the head of Jakolof Bay, 11 miles by water from Seldovia.

Estimates of ore available in the region are based on measurements of the surface dimensions of the ore-bearing bodies of rock, with the assumption, made necessary by the lack of underground development work, that the bodies are at least half as deep as they are long. The figures given are, therefore, only approximate but are regarded as of the proper order of magnitude. Channel samples taken across promising deposits were analyzed in the chemical laboratory of the Geological Survey in Washington.

Of 13 deposits known at Claim Point, only two, the Reef mine and the Bluff No. 1 deposit, appear to be important from an economic standpoint. The Reef mine produced 2,000 tons of high-grade ore during the first World War, but as it is on a small islet and has already been worked below high-tide level, not more than 500 to 1,500 tons more can be extracted without expensive installations for submarine mining. The Bluff is a lenticular deposit at least 200 ft. long and 45 to 50 ft. wide in the center. The chromic oxide (Cr_2O_3) content of the banded ore ranges from 13 to 46 percent. The chromite is disseminated through the rock in grains usually 1 millimeter or less in size, which contain 58 percent of chromic oxide and have a chrome-iron ratio of 3.2 to 1. Some shipping ore can probably be obtained by hand sorting, but most of the ore will require concentration. An estimate of 30,000 tons of chromite concentrates and shipping ore in this deposit seems justified. The other deposits may have a total of 2,000 tons of concentrates.

The total chromite reserves known at Claim Point therefore appear to be about 33,000 tons. There is reason to expect that exploratory work, particularly diamond drilling or mine development, might increase this figure materially.

At Red Mountain one deposit, the Star No. 4, probably contains half the minable ore of the area. This body has a width of 5 to 10 ft. for a distance of 400 ft., with narrower extensions for several hundred feet more. The deposit may contain 60,000 tons of high-grade ore. Analyses of channel samples gave values ranging from 47 to 52 percent Cr_2O_3 chromic oxide, with chrome-iron ratios better than 3 to 1. In addition there is some lower-grade ore, which will require concentrating. The deposit is situated on a comparatively level bench 1,500 ft. above the main valley and cut off from it by cliffs, which will make the transportation problem a difficult one. It will probably be necessary to construct an aerial tram to bring the ore down to the valley.

Only one other body, the Juneau No. 1, is believed to contain more than a few hundred tons of shipping-grade ore. It may have 2,000 tons of high-grade ore and an equal amount of ore assaying 35 to 40 percent chromic oxide. Ten other deposits contain more than 1,000 tons of potential concentrates each, their total being 43,000 tons. These ore bodies are scattered in the rough, mountainous country, and some are almost inaccessible. Some of them probably would not repay the cost of mining the ore and getting it to a mill. Nineteen other bodies apparently contain a total of about 5,000 tons of shipping ore and concentrates. Probably few of these smallest bodies can be worked profitably as independent deposits, but development work on the larger deposits will automatically open up some of them as auxiliary sources. The chromite reserves at Red Mountain are estimated to be 115,000 tons. Exploratory work is very necessary here, also, to determine the depth to which the deposits extend.

What Can Be Done to Reduce Haulage Accidents*

Underground haulage is a source of many accidents unless careful precautions, such as outlined in this article, are taken.

By C. L. LUTTON

Safety Director
H. C. Frick Coke Co. and
Associated Companies

IN the preparation of an informative paper pertaining to the subject of haulage accidents it seemed advisable to obtain information relative to past experiences of the cause of underground haulage accidents, covering as long a period of years as possible and endeavor to arrive at some logical conclusion regarding what may be done in a practical way in the future in the application of remedial measures that tend to reduce accidents to underground workers from hazards incident to the transportation of product, refuse, and material. It was also deemed advisable to obtain information relative to the experience of operations located in representative coal mining areas. Information was solicited from safety department executive heads of several large mining companies with extensive operations in the Appalachian District; also suggestions or recommendations which they desired to make that, in their opinion, would promote safer operation of underground coal mine haulage systems. Statistical information was also obtained from the Safety Division of the United States Bureau of Mines, Pittsburgh Station. I wish to acknowledge the very generous contributions and cooperation received, and to extend my sincere appreciation for their contributions.

Records of U. S. Bureau of Mines Establish Magnitude of the Problem

A review of the various coal mine accident statistical records available, or obtainable, in the limited time allotted for the preparation of this paper, disclosed that the United States Bureau of Mines bulletins captioned "Coal Mine Accidents," for the years 1930-1937, inclusive, contained the most pertinent information relative to haulage accident experience in coal mines of the United States. One unfavorable feature regarding the selection of these data is that complete records are not available for any calendar year subsequent to 1937 for a determination as to whether or not haulage accident frequency rates have increased or decreased during the past three years, and whether or not the introduction of mechanical loading equipment has materially affected the hazards of haulage incident thereto compared with hand-loading systems.

The statistical accident records compiled by the United States Bureau of Mines, relative to the computation of the accident frequency rate per million man-hours worked for any particular class or group of workers, are arrived at by using the total man-hours worked by all classes of workers but only the accidents experienced by a particular class or group are used in calculating the frequency rate for that particular group; this is not an accurate picture of the actual accident experiences of a particular class of workers or the inherent hazards, probable unsafe practices, etc. In order to arrive at a true frequency rate figure it would be necessary to use as a basis the number of man-hours actually worked by any class or group of workers, and the accidents experienced by that class, rather than the total man-hours worked underground by all classes or groups. Several of the larger companies have these figures available but they are not applicable to the coal industry of the United States in determining haulage accident frequency rates experienced in all coal mines of the country.

Attention is also invited to the following extract from the United States Bureau of Mines Bulletin No. 430, page 26, under comments regarding "Falls of Roof and Coal": "The chief victims of these accidents (falls of roof and coal) in coal mines are the miners, loaders, and machine men (those whose regular work is at the face where the coal is undercut, blasted, and loaded) although other classes of underground employes, notably haulage workers, often are injured or killed by falls of roof and coal." Based on this statement, it is assumed that transportation department workers killed or injured by falls of roof or coal are recorded as accidents caused by falls and not as haulage accidents. Some companies classify accidents in conformity with primary causes in preference to direct causes of injury; for example: in event derailed haulage equipment dislodges roof supports, causing a fall of roof or side, which injures a transportation worker, the accident is charged to the indirect cause (derailment), facilitating the devising and application of remedial prevention of similar occurences.

Causes of Accidents

The two tables that are a part of this paper are self-explanatory and to those who desire to study them no comments are necessary other than to invite attention to the fact that Table 1 is a compilation of underground haulage disabling accident injury rates

* Presented at Thirty-second Annual Convention of Mine Inspectors' Institute of America, Bluefield, W. Va., June 2, 3, 4, 1941.

TABLE 1.—FATAL AND NONFATAL INJURY RATES PER MILLION MAN-HOURS UNDERGROUND FROM HAULAGE — COAL MINES IN THE UNITED STATES — YEARS 1930-1937, INCLUSIVE

Cause: Mine Cars and Locomotives	Rate per Million Man-Hours Underground									Percent of Average to Total
	1930	1931	1932	1933	1934	1935	1936	1937	8-Year Average	
A. Struck, Run Over, or Squeezed Between Cars or Locomotives:										
(a) While coupling	3.596	3.223	2.986	2.623	3.162	2.653	3.340	3.261	3.105	14.29
(b) While switching, spragging, blocking, braking	2.584	2.319	2.327	1.791	2.072	1.912	1.982	2.039	2.128	9.80
(c) While pulling or pushing car	1.891	1.899	1.955	1.665	1.555	1.637	1.508	1.643	1.719	7.91
(d) While operating or riding trip	1.496	1.327	1.559	1.272	1.292	1.340	1.363	1.371	1.378	6.34
(e) All other	1.491	1.192	1.058	.809	1.806	1.522	1.195	1.203	1.195	5.50
(Total, "A" Classification)	11.058	9.960	9.885	8.160	9.167	9.064	9.388	9.517	9.525	43.84
B. Squeezed Between Car and Rib, Timber, or Roof:										
(a) While coupling	1.280	1.530	1.330	1.135	1.028	1.034	.928	1.113	1.172	5.39
(b) While switching, spragging, blocking, braking	1.957	1.648	1.388	1.146	1.380	1.280	1.260	1.070	1.390	6.40
(c) While pulling or pushing car	1.107	1.136	1.013	.950	.856	.973	.919	.851	.976	4.49
(d) While operating or riding trip	.772	.853	.890	.661	.768	.822	.859	.863	.810	3.73
(e) All other	.788	.840	.528	.682	.625	.821	.798	.759	.730	3.36
(Total, "B" Classification)	5.904	6.007	5.149	4.574	4.647	4.930	4.764	4.656	5.078	23.37
C. Derailments	1.064	1.064	.961	.919	.905	1.060	1.100	1.107	1.023	4.71
D. Rerailing Derailed Cars	1.660	1.481	1.208	1.206	1.381	1.364	1.315	1.295	1.364	6.28
E. Pulling or Pushing Cars by Hand, Strain From	1.514	1.230	1.312	1.217	1.146	1.523	1.225	1.093	1.283	5.91
F. Animals on Haulage	1.321	1.146	.833	.755	.724	.765	.761	.514	.852	3.92
G. Falling From Cars (Not Run Over)	.328	.319	.323	.289	.278	.330	.269	.208	.304	1.40
H. Runaway Cars in Dips or Slopes	...	.385	.362	.290	.253	.385	.395	.424	.312	1.44
I. Other Haulage Accidents	2.689	1.801	1.553	1.640	2.132	2.387	1.872	1.790	1.983	9.13
Total, All Classifications	25.538	23.393	21.586	19.050	20.633	21.808	21.089	20.694	21.724	100.00

NOTE: Data for years 1930-1937, inclusive, are from United States Bureau of Mines Bulletins 355, 373, 380, 387, 397, 409, 420, and 430, respectively.
8-Year Average data and percent of average to total compiled from data for years 1930-1937, inclusive.

per million man-hours worked, based on man-hours worked by all classes of underground workers, classified as to causes, for the years 1930-1937, inclusive; also, the 8-year annual average compiled from these data and the percentage of each classification to the total 8-year annual average. The causes are divided into nine classifications, classes "A" and "B" containing five subdivisions each. It will be observed that classification "A" ("Struck, Run Over, or Squeezed Between Cars or Locomotives"), containing subdivisions (a), (b), (c), (d), and (e), accounts for 43.84 percent of the total average frequency rate of 21.724 for all classifications of haulage accidents during the 8-year period. Likewise, classification "B" ("Squeezed between Car and Rib, Timber, or Roof"), containing subdivisions (a), (b), (c), (d), and (e), accounts for 23.37 percent more of the cause of the total haulage accidents. By adding 4.71 percent for derailments and 6.28 percent for rerailing derailments, classifications "C" and "D," respectively, we find that 78.20 percent of the total haulage accidents occur from the above four principal causes. Attention is particularly invited to the frequency rates of injuries under the classification "While coupling," which account for 19.68 percent of all injuries experienced in underground haulage.

Table 2 is a compilation of the total underground man-hours, the number of haulage accidents and corresponding rates per million man-hours worked for the classifications of fatal and nonfatal accidents; also, the total tons produced in the coal mines of the United States from 1930 to 1939, inclusive, and the 10-year annual average.

According to Bureau of Mines records, the annual average number of coal mines in operation throughout the United States during the 8-year period 1930-1937, inclusive, was 6,382. Taking into consideration the variable natural mining conditions, systems of mining, haulage systems, types of mine cars, couplings, and local customs in vogue at these mines, obviously it is impossible for any one person or group of persons to recommend the logical procedure in connection with a haulage accident prevention campaign unless he or they are thoroughly informed regarding the above-mentioned important factors. Therefore, no attempt will be made to offer a cure-all for haulage accidents in all coal mines.

TABLE 2.—FATAL AND NONFATAL ACCIDENTS UNDERGROUND FROM HAULAGE—COAL MINES IN THE UNITED STATES—YEARS 1930-1939, INCLUSIVE

Year	Total Underground Man-Hours	Fatal Accidents	Fatal Accident Rate per MMHW	Nonfatal Accidents	Nonfatal Accident Rate per MMHW	Total Fatal and Nonfatal Accidents	Total Fatal and Nonfatal Rate per MMHW	Total Tons Produced
1930	847,054,622	325	0.384	21,307	25.154	21,632	25.538	536,911,136
1931	670,051,882	237	0.354	15,437	23.039	15,674	23.393	441,750,978
1932	523,399,546	179	0.342	11,119	21.244	11,298	21.586	359,565,093
1933	589,599,407	194	0.329	11,038	18.721	11,232	19.050	383,171,877
1934	630,787,682	197	0.312	12,818	20.321	13,015	20.633	416,536,313
1935	600,095,998	228	0.380	12,859	21.428	13,087	21.808	424,632,005
1936	675,289,661	228	0.338	14,013	20.751	14,241	21.089	491,138,762
1937	666,638,691	275	0.413	13,520	20.281	13,795	20.694	498,792,928
1938†	503,893,682	165	0.327	9,245	18.347	9,410	18.675	395,696,632
1939‡	549,848,900	182	0.331	9,755	17.741	9,937	18.072	447,976,639
10-Year Average*	625,666,007	221	0.353	13,111	20.955	13,332	21.308	439,617,236

NOTE: Data for years 1930-1937, inclusive, are from United States Bureau of Mines Bulletins 355, 373, 380, 387, 397, 409, 420, and 430, respectively.

† Data for year 1938 are from United States Bureau of Mines Circular H.S.S. 279.

‡ Data for year 1939 are from United States Bureau of Mines Circular H.S.S. 285; also, article titled "Coal Mine Accidents in 1940—an Unenviable Record," in the March, 1941, issue of the MINING CONGRESS JOURNAL. Man-hours obtained by calculating from the data for the years 1930-1939, inclusive.

* 10-year average obtained by employing data for the years 1930-1939, inclusive.

Coupling Cars a Prolific Source of Accidents

The average tonnage produced per year over the 10-year period 1930-1939, inclusive, of 439,617,236 tons; assume for convenience that this was the average production per year for the 8-year period 1930-1937, inclusive. As previously stated, 19.68 percent of the total average accident frequency rate to transportation employes underground was under the classification "While coupling," and constitutes practically one-fifth of the cause of injuries to underground haulage workers, which apparently is excessively high, and without thorough analysis may appear to be unreasonable. However, if we assume that the average production stated above was loaded in mine cars having a capacity of 2½ tons (an average which appears to be conservative), each car transported a round trip between the dumping and loading points. In this operation at least two couplings were made by transportation workers, which would necessitate the making of 351,693,780 couplings and a like number of uncouplings. The average number of underground haulage accidents while coupling each year (over the 8-year period 1930-1937), was 2,805, which is equivalent to an average of 125,381 couplings per disabling injury. Apparently, carelessness on the part of the injured was not the only cause but if haulage accidents caused by coupling are to be reduced in the future, improvement in the types of couplings should receive serious consideration.

Large Capacity Cars and Automatic Couplers Reduce Accidents

The introduction of mechanical loading equipment has promoted the adoption of larger capacity cars, many of which are equipped with couplers designed to couple automatically on track curves of a radius commensurate with the wheel base of the equipment without manual adjustment or alignment of couplings and are a marked improvement in the promotion of safety and economy in mine haulage. Therefore, those companies that are making or contemplate making intensive changes in their system of loading and transportation of product are in an enviable position to accomplish improvements in the accident frequency and severity rates of transportation workers, by the selection of proper equipment designed to reduce the hazards of the transportation system. In connection with the hazards involved in the use of mining equipment and machinery, the designers and manufacturers can be of invaluable service to the mining industry in the designing of this equipment and machinery. Information pertaining to such hazards can be obtained from the mining companies of mining districts in which the equipment is in service, and by consultation with operating and safety department officials, the State Department of Mines, the Safety Division of the United States Bureau of Mines, and other organizations and associations organized and conducted to promote the prevention of accidents in coal mines.

In mines where major changes in mining or system of transportation are not contemplated a reduction in haulage accidents may be effected by improvement in conditions and practices which contribute to haulage accidents in those mines.

An enumeration could be made of many suggestions, mining laws, and safety rules and regulations, pertaining to safe practices and prohibiting recognized unsafe practices in vogue at operations of many large mining companies, particularly those where organized accident prevention activities are in progress; however, these companies are sincerely interested in devising ways and means of adopting remedial measures with a view of preventing accidental occurrences, and are well informed regarding their own problems. Generally speaking, these companies have made commendable reductions in preventable accidents and are strenuously endeavoring to achieve further improvement. However, there are many other mining districts and companies in the United States that may not have as yet established organized, systematic accident prevention activities and are governed largely by past customs and practices, apparently being satisfied with their accident frequency rate, although relatively high compared with other simlar mining districts.

Haulage Accidents Can Be Reduced

Previous reference has been made regarding some of the mining companies segregating man-hours worked

by various classes or groups of workers for the purpose of determining the accident frequency rate experience for those particular classes of workers. Based on information available relative to the percentage of the total man-hours worked by various classes of underground workers, the man-hours worked by underground transportation department employes vary from 8 percent to 12½ percent of the total man-hours of all underground workers. Assuming that 10 percent is a conservative basis for the coal mines of the United States, the actual average annual accident frequency rate experienced during the 8-year period tabulated in Table 1, of 21.724 accidents per million man-hours worked, would be 10 times greater, or 217.24 fatal and nonfatal inuries per million man-hours, if limited to the man hours worked by underground haulage workers. Therefore, it is apparent that a concerted effort to reduce materially the prevailing fatal and nonfatal accident frequency rate experienced by underground haulage workers is not only desirable but imperative if the coal mining industry is to retain its position in the rank of efficiently planned and managed industries.

Based on past experience, the coal mining companies that have for some years past conducted organized, systematic accident prevention activities experience haulage accident frequency rates 60 to 80 percent lower than the general average for the coal mines of the United States. It is to be believed that comparable results can be effected in other coal mines of the country if the State Mining Department and operating company officials will assume the initiative and acquire a sincere desire to achieve improvement. This desire should be acquired by the executive head and reflected down through the management and supervisory forces to the rank and file. Without sincerity on the part of management and supervisory forces they can hardly expect cooperation in the elimination of unsafe practices by rank and file haulage department employes.

All Departments Must Cooperate in Safety

In promoting reasonable safety for underground transportation employes —I say "reasonable safety" because at best it is inherently a hazardous occupation, particularly in mines with coal seams less than 60 inches in thickness —it is imperative that complete cooperation exist between State Mining Department representatives, engineering, operating, supervisory, and safety department officials of a mine, group of mines, or company. All departments should be service agencies to aid and assist the operating department. Proposed changes, whether they be intended to reduce accidents, promote healthy mine atmosphere, increase or decrease tonnage, or effect economy in costs, should be thoroughly discussed in conference, analyzed, and agreed upon by a majority of the department heads and supervisory forces of the departments affected.

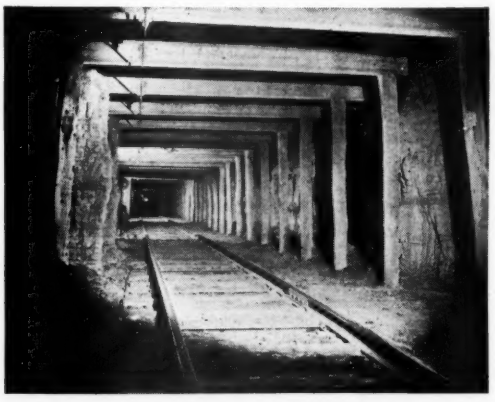
Effective prevention of haulage accidents, and a similar accomplishment of other desired results in coal mines, can best be obtained when all department personnel assume their respective responsibilities and function efficiently in cooperation with other departments. Many hazardous conditions, particularly in connection with underground haulage, are primarily due to faulty design of equipment. Concrete examples can be observed in many mines —for instance: large capacity mine cars not equipped with brakes, or equipped with brakes that can be applied or released from one side of the car only; bumpers too short to provide sufficient clearance between cars for safe coupling or uncoupling; adoption of a type of coupling that increases coupling hazards, promotes broken trips, excessive mine car maintenance costs, etc. Failure of supervisory forces to insist upon headings and other development excavations being driven strictly in conformity with engineers center line drive sights complicates or precludes the provision of adequate continuous clearance on one side of haulways, an important factor in promoting safe haulage conditions. Thin-vein type gathering locomotives should be manufactured with safety decks on the noncontrol end to reduce the danger of brakemen being crushed between low roof, roof supports, etc., as may occur where comparatively high-end-frame type locomotives are used. Recent mine car designs tend to low-wheel roller-bearing running gear, with bodies extending out over the wheels to provide capacity; in event of derailment the car body rests on the track rail, or at least prevents the use of available type of rerailing devices; the absence of a practical rerailing device other than a lifting jack invites the use of improvised blocks, cap-pieces, ties, stiff jacks, etc. The designing of a practical rerailing device for this type car is the prerogative of the engineering department.

Analysis of Past Experience Helpful

To accomplish a reduction in haulage accidents the procedure should be similar to attempting to effect a reduction in accidents to coal mine workers in other departments of a coal mine, section of a mine, or group of mines. It is advisable to analyze the past accident experiences over as long a period as possible; ascertain the most prevalent causes; seriously consider changes in mining methods, systems of distribution, gathering, assembling, and transportation of mine cars; mine tracks; haulage practices, etc.; and to devise and introduce practical improvements that will promote safer working conditions, which frequently effect other haulage economy.

Standard practices should be adopted and promulgated in the form of printed safety rules for the guidance of the management, supervisors, and underground workers.

Systematic, educational job training should be conducted in conformity with the facilities available, thereby promoting and developing safety consciousness in haulage workers and supervisory forces.



Clean track and good timbering promote safety on haulageways

The Effect of Excess Profits Tax on the Gold Mining Industry

By BRUCE McDONELL
Executive Secretary, California
State Mining Board, Sacramento

THE placing of an excess profits tax on gold mining is not only a question of a loss to the financial structure of the country but to each gold-producing state and to normal employment, for it does not affect the large mining companies that have been operating over a period of years nearly as much as those companies that have just recently started to pay dividends after years of development expenses have been incurred.

The worst effect that this tax will have is that it will very seriously retard the development of new mines, both of individuals and mining companies. A recent example of this was the proposed opening up of a group of mines in Grass Valley, Calif. To open up and put on a production basis, this group of seven mines would require an outlay of $1,000,000. This operation alone would employ close to 100 men for a period of several years. Then, if this undertaking proved successful, it would probably mean the employment of upward of 1,000 men for many years to come.

But, with the excess profits tax on gold, these individuals would be gambling a million dollars, and still would be limited to an 8 percent return on their capital investment. Therefore, naturally, they have withdrawn from such an operation, and that amount of money will more than likely drift into the channels of tax-exempt securities, thereby adding nothing to the employment or wealth of our country.

All profits derived from the following strategic minerals, chromite, manganese, tin, antimony, tungsten, and quicksilver, are exempt from taxation, whereas gold, which is most important to the financial structure of the Government, has been left off the list of exempted minerals in the excess profits tax bill.

Section 304 (c) of the Revenue Acts of 1918 and 1921 exempted income from gold mines from the war profits and excess profits taxes.

The same conditions, which justified exemption then, exist today. Gold is not a war industry. The price is fixed; no abnormal profits can be made. There can be no profiteering. No new millionaires can be created from gold mining by war industry stimulation. In lieu of abnormal profits, gold mines will be faced with the hazard of extinction from inflated costs of labor and materials. During the last war many gold mines could not meet the wage scales of mills, shipyards, and powder factories and operate at a profit. In times of tremendous governmental credit expansion and trends toward credit inflation, production of gold mines should be encouraged and no laws enacted which will destroy the opportunity to develop marginal ores, discourage new explorations, reduce new discoveries, and curtail production.

The disadvantages from putting additional taxes on gold mining would outweigh the advantages, and it is probably true that, from a long-range view, no greater revenue would be derived. The additional tax revenue, if any, to be derived from excess profits taxes on gold mining would be insignificant, compared with the loss of national wealth and national income resulting directly or indirectly from the deterrent of increased taxes on explorations and operations. Gold production is a noninflationary force, and should be promoted and not crippled.

After this war gold will be the only standard of value, as it is the only commodity in whose value the public have confidence and to which they turn most quickly for security in times of emergency. This has been true for thousands of years. The gold standard is the only standard that has any chance of remaining international on a long scale.

The great problem of the future will be the problem, through international cooperation, of improving the gold standard by making gold more stable in value and the gold standard more secure.

CONVEYOR MINING In MULTIPLE SHIFTS

The Carbon Fuel Company has mechanized two operations for speed and efficiency in mining.

By THOS. W. McGUIRE
Chief Engineer
The Carbon Fuel Co.

OPERATING in the Powelton seam, Kanawha County, W. Va., the Carbon Fuel Co. has completely mechanized two of its operations in its thinnest coal where the seam averages 36 in. in thickness. The coal is loaded at room faces by hand loaders into chain face conveyors which deliver into chain room conveyors; and these in turn deliver to a 24-in. belt conveyor in the butt entry.

The 24-in. belt conveyor delivers onto a 30-in. mother belt in the main entry; this mother belt then delivers to a 30-in. weightometer belt where the coal is weighed before it is discharged into a 300-ton balance bin, as shown on the accompanying sketch.

The Powelton seam is fairly uniform in character and thickness in our mines. In the producing sections it lies between a hard slate bottom and a medium-hard shale roof. The coal seam is 34 in. thick here and it carries a 4-in. false bottom that is left in the mine; otherwise the seam is free of visible impurities.

Conveyors Adapted to Room and Pillar Method

Operations are carried on by room and pillar methods, rooms 50 ft. wide being advanced from a pair of butt headings. Twenty to 30 rooms are driven on 60-ft. centers to a depth of 300 ft. from each butt heading, except where rooms are to the dip, when a depth of about 275 ft. is found most practicable. If rooms opposite are to the rise then a depth of 325 ft. is obtained.

No breakthroughs are driven between rooms; 12-in. blower fans provide the ventilation. Of the 10-ft. pillars between rooms, 6 ft. is recovered by slabbing as the equipment is removed therefrom, the remainder of the pillars being left for roof support. Rooms for the first 30 ft. are driven 20 ft. wide and then widened to full width. The room conveyor is carried 6 ft. from the right rib, and a sight line 11 ft. from right rib. Room faces are undercut with low-vein undercutting machines, which make a 6-in. kerf on the bottom of the seam above the false bottom.

The drilling and blasting of the coal in rooms is accomplished by means of six holes near the top drilled with hand-held electric auger drills. Each hole is charged with one and one-half to two sticks of permissible explosive and tamped with incombustible stemming. Charges are detonated on shift, one at a time, by single-shot permissible battery. Periodic checks must be made on the blasting to prevent coal from being shot too heavily and making an excess of fines.

Posts are set on 4-ft. centers both ways, and one post is set in the middle of each square so formed except between post row Nos. 2 and 3, which is kept open for tramming of equipment as indicated on the room chart.

It will be noted on the room chart that room is widened to the right. This method is used at one of our mines, but at the other rooms are widened to the left. It has been found that rooms widened to the left give the most satisfactory results, as this admits of the step system of mining, which gets the men in coal quickly at the beginning of shift and keeps delays down to a minimum.

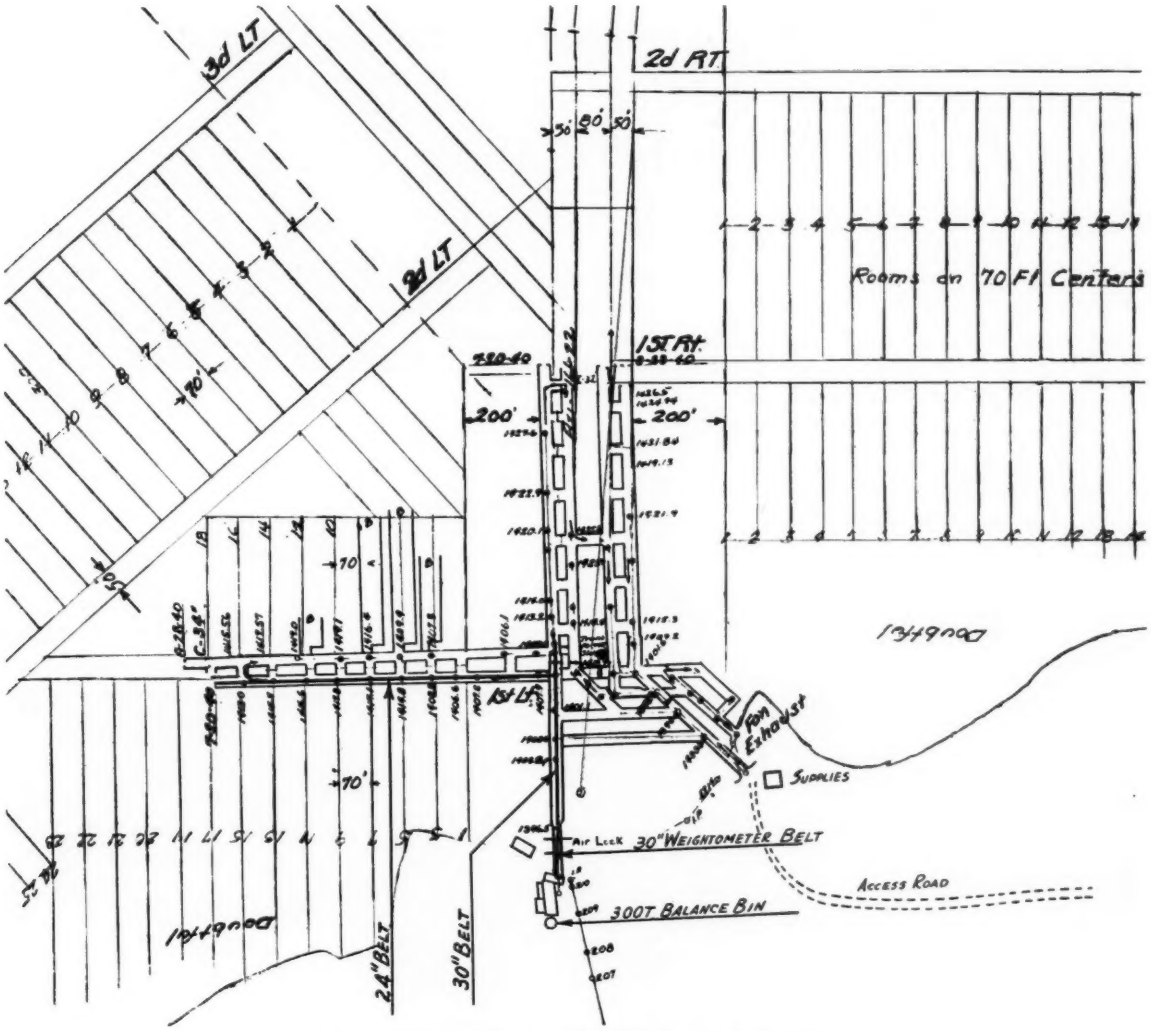
Attention is invited to the room chart which has proved useful in planning "moves." This chart is drafted on the principle that 100 percent equals the number of days it takes a room to work out under normal working conditions, in accordance with the mine's experience. In our experience this time is 12 days, therefore a 300-ft. room is divided into 12 equal parts; when a new room is started, the starting date and completion date are recorded on the chart. Daily progress of the room is marked up, and the chart shows at a glance whether or not the rooms are progressing according to plan.

Five men are employed in a gang working each room and each shares alike in the coal produced. The coal is measured daily and checked by weightometer on the belt previously mentioned. Rooms are advanced under normal working conditions 25 ft. in two 7-hour shifts. Supplies are placed in the room necks on the third shift.

Supplies Handled to Room Necks on Third Shift

The seam lies about 300 ft. above the stream in the valley, and supplies are hauled to the drift-mouth by means of motor truck over a road constructed on a 10 percent grade. From the drift-mouth, supplies are delivered to room necks by means of a 6-ton battery motor running on 30-lb. steel rail laid on steel and wood ties in the in-by entry, as indicated on the map. A minimum height of 44 in. is maintained in supply entry and for a 4-ft. walkway along the mother belt entry. Forty percent of the rooms are taken on advance and the remainder on retreat.

Belt units of 2,000 ft. are maintained. One extra belt head and tail are kept on hand to facilitate development; this allows the retreating belt to be put to work at once in new development headings. Five units will average 550 tons daily, or 10.5 tons per man. Gang leaders are made responsible for all equipment with which each has to do; responsibility for breakdowns is thereby fixed.



Part of the mine layout, such as is used in planning "moves"

Careful Supervision Required for Successful Conveyor Mining

The four things found most important to successful conveyor mining are: First, a good seasoned mine foreman who knows his work and likes this type of mining and who knows how to handle men to obtain their best effort; second, supplies must be on hand when needed; third, keep a daily log in addition to necessary face reports so that proper planning of moves can be made with minimum loss in tonnage output; fourth, the crews must be trained to act as a unit; that is, let each man do that for which he is best fitted so that he accomplishes his part of the required work. These points require intensive supervision; that alone, plus proper care and maintenance of equipment, is what makes for successful conveyor mining.

The proper mental attitude toward the use and care of the mechanical equipment employed in the mine is obtained by constant daily teaching and training of men who will operate that equipment. This, we believe, is conveyor mining's biggest problem.

Beavers Help Water Supply

Beavers have been enlisted as helpers in providing a water supply for Salmon City, Idaho. A recent dispatch states that five live beavers were transplanted in the fall of 1939 by the Idaho fish and game department to Jesse creek, above Salmon City. They have aided materially in providing adequate water for the community. The creek is one of the main sources of water supply for the city and the presence of the beaver colony is said to have made it unnecessary for a man-made dam to be constructed in that area.

Dams constructed by the beavers have materially decreased the amount of foreign material in the water that ordinarily goes to the filtration plant, owned by the city. Pools behind the dam act as settling basins and the water comes out clear. It is also said that the flow of water has been so stabilized that the creek supplied sufficient water for the city throughout last year and a proposed supplemental supply was not necessary. It is planned to plant beaver colonies on other streams for the same purpose.

How Oxy-Acetylene Processes Can Cut Mine Maintenance Costs

Mining companies, for the 'duration,' will have to depend more and more on repairing and rebuilding, rather than replacing, worn equipment. This article is therefore particularly timely.

By H. C. STELLING
The Linde Air Products Company

THE role played by oxy-acetylene processes in the mining industry has long been important, and it is particularly so at this time when emphasis upon increased output and peak operation make maintenance problems a matter for efficient and economical solution. The oxy-acetylene flame provides a rapid means of increasing the life of wearing parts, repairing damaged equipment, fabricating new equipment, and scrapping obsolete structures. Those processes most used in the mining industry, hard-facing, welding, cutting, gouging, and flame-hardening, depend upon only a few basic requirements for the various operations—a source of oxygen and acetylene, and the interchangeable apparatus, which is portable and readily adaptable to a wide range of uses.

Hard-Facing

Wherever equipment encounters abrasion or severe impact, the life of the wearing parts is shortened to considerably less than that of the rest of the machine. Shutdowns, repairs, or replacements inevitably follow, with loss of valuable production time. By means of hard-facing, however, in which a coating, edge, or point of wear-resisting alloy is deposited on the wearing part, the life of those members receiving the greatest abrasive action can be materially increased. Even when applied to new parts, the additional cost is more than offset by the greatly increased life of the part. An important feature of the process is the fact that when hard-facing eventually shows signs of wear it can be restored quickly by another application of the material.

Hard-facing, which is standard practice at a large number of mines, finds many uses both above and below ground. The life of underground scraper blades, dipper teeth, latch-keys, and ordinary hand shovels can all be increased greatly. In fact, an increased life ratio of 7 to 1 over ordinary steel is not uncommon in this practice. Augers complete from five to seven times as much footage between dressings when hard-faced on the tips and flutes. Hard-faced grizzly bars have been known to retain almost their original size after seven months of service, while during the same period of time ordinary steel bars became so badly worn as to be practically unserviceable.

Above: The arrow points to a hard-faced test bar in a grizzly. The other bars were unfaced. Note the comparatively unworn condition of the hard-faced bar

A particularly interesting application is the hard-facing of coal undercutter bits. Jigs, or holding devices, are frequently used in this operation for positioning a number of bits close together on a round, revolving table. It is not unusual for an experienced operator to hard-face several hundred of these bits per hour.

A survey of 12 different coal mines in the Illinois field shows the average inventory of bits formerly needed to keep the operations under way was approximately 5,000. One company operating three large mines used 5,300 per mine, another 10,000, and several of the smaller ones only 2,000 to 2,500 bits. The survey brought out the fact that all of the mines now using only hard-faced bits require an average of less than 2,000 per mine. The mines that formerly needed 5,300 bits now require only 1,300 each. The one formerly requiring 10,000 now uses only 3,000, and those mines formerly using 2,000 or 2,500 bits now require only 700 to 800 bits.

Hard facing the blade of an underground scraper

A "merry-go-round" jig for hard-facing coal under-cutter bits

Oxy-Acetylene Welding Provides Economy in Repair and Rebuilding

Oxy-acetylene welding provides a ready means of rapidly repairing broken equipment and building up worn parts to their original size. Since practically all metals can be welded successfully, this process gives the mine maintenance department complete control over emergency and routine repairs. The expense of replacing damaged equipment can be cut down considerably by welded repair which returns the broken part to full strength or better, while reducing the length of shutdowns to a minimum. Steel parts are generally fusion-welded with an alloy steel rod, while cast-iron parts are more often repaired by bronze-welding. Bronze-welding is an important application of the oxy-acetylene process in which joints are not true fusion welds, as the base metal is not melted. Bronze-weld metal, however, forms a strong bond with metal surfaces which have been heated to the proper temperature and treated with a suitable flux. The result is a speedily made and economical weld of excellent strength.

Another use of the bronze welding rod is for bronze-surfacing. This process sees wide application in many mines for building up the surfaces of worn parts; for example, high-speed pumps, which previous to the use of the oxy-acetylene method for reclamation could be found by the hundred in mine scrap piles. They are first preheated; then the worn spots are resurfaced with metal from the bronze rod, and finally machined to original size. Every mine has hundreds of equipment parts, such as valves, drums, rolls, sheaves, shafts, bearings and bearing caps, and gear teeth, that can be effectively restored to service by this method.

Aside from repair, oxy-acetylene welding, both of the fusion type and bronze-welding, is also valuable for extensive fabricating work such as needs to be done at every mine. Various equipment needs, such as machine bases, covers, and guards, car frames, and hand trucks, can readily be fabricated from steel sheet, plate, and pipe by welding and cutting. A most important application of welding, both of the fusion type and bronze-welding, is the welding of mine rails.

Most mines require an extensive piping system for the fabrication of which oxy-acetylene welding offers many advantages. There have been important developments in pipe-welding techniques, such as multi-flame welding tips and a special alloy welding rod, which makes possible extremely rapid and economical joining of pipe and casings, which will be leakproof and maintenance-free for the life of the pipe. Wrinkle-bending, a heating process, which resulted from investigations into means of quickly effecting pipe bends, is also a process ideally suited for installing industrial piping by tailoring it to fit.

Heating is an important use of the welding blowpipe not only for wrinkle-bending pipe but also for a multitude of metalworking operations, such as the straightening of metal parts that have been warped or damaged and for bending other parts to shape.

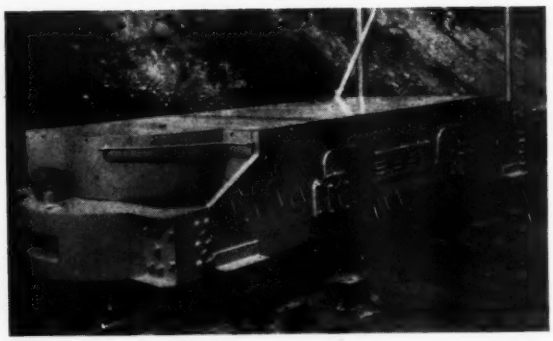
Cutting Can be Expedited

For the demolition of structures and for salvaging iron and steel in all forms the oxy-acetylene cutting blowpipe is without rival. Rivets and bolts can be removed without damage to the adjacent plate metal, and obsolete structures can rapidly be cut to movable size.

Although the blowpipe is widely

A hoisting engine cylinder, broken by freezing, and the repair made by bronze-welding

One piece steel drive gear cut and removed from shaft by careful work with the hand-cutting blowpipe



A portable cutting machine was used for fabricating practically all the parts of this locomotive

used for cutting simple shapes in plate, in recent years the growing use of oxy-acetylene cutting for fabricating equipment about the mine has caused many mines to adopt oxy-acetylene cutting machines for shape-cutting operations. These machines will cut plate of all commercial thicknesses in straight lines, circles, and intricate shapes. Straight lines can be cut with edges that are either square or beveled. The machines can be guided by hand and, in many instances, by means of a templet or guide track. Portable machines are used most frequently, except in the larger maintenance shops where the volume of work may require a stationary machine. The portable machines have a wide range of uses and can be carried to the work instead of the work to the machine, as is usually necessary with other fabricating methods.

A list of typical mining equipment parts that are regularly being made by oxy-acetylene machine-cutting would include side frames, brake rigging, spring hangers, bumper plates, deck plates, covers, pedestal straps, switch points, frog points, conveyor flights, sprockets, pipe flanges, washers, and coal screens. Other uses of the cutting machine are for squaring ends of old rail; beveling sheet and plate for hoisting drums, sand boxes, gear cases, mine-car dumps, and switch boxes; and cutting plates and flanges used in assembling mine cars, mine locomotives, and ore classifiers.

An outline of the cutting procedure used in the reclamation of worn locomotive tires and the fabrication of switch points should help to emphasize the importance of this oxy-acetylene process. In the mines where these procedures were developed they are performed to such an extent that they might well be considered semi-production in nature.

Removing false flange on a worn locomotive tire with a portable cutter

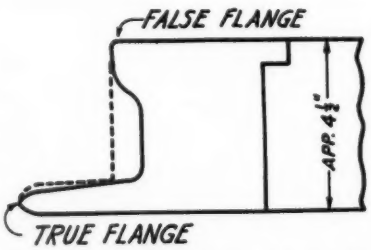
Reclamation of Mine Locomotive Tires

Although mine locomotive tires are quite hard, being made of 0.60 to 0.70 percent carbon steel and shrunk-fit to the center of the wheel, the wearing action of the locomotive brake shoes is so great that as much as ½ or ¾ in. of steel may be worn from a tire in less than three months. This wear occurs next to the flange, as shown in the sketch to the right. For the process of reclaiming the worn tires a portable cutting machine, equipped with a heavy-cutting attachment, is used.

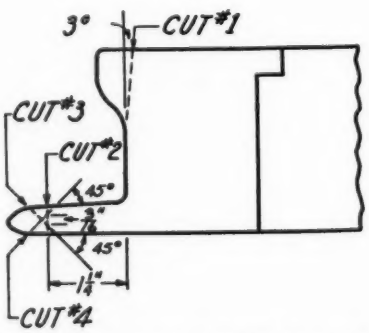
First, the truck is removed from the locomotive and positioned vertically on one end. There is no need to remove the wheel from the truck. A riding surface on the wheel for the cutting machine is provided by a circular plate, about 1 in. larger in diameter than the inside diameter of the tire on which it is to rest. This plate is cut from ½-in. material and has a hole drilled through its center so that the radius-bar centerpoint of the cutting machine can extend through it and into the center hole of the axle. When locomotive trucks are equipped with axles that protrude beyond the wheel, the center hole in the riding plate is cut large enough to fit over the axle and an offset radius rod is used.

Shaping the tires requires four separate cuts, as shown in the sketch below. Cuts are made in the order indicated for two reasons: First, because checking is most likely to occur in cuts Nos. 3 and 4, and this tendency is reduced by the heat added to the metal in making cuts Nos. 1 and 2; second, because the extra heat makes it possible to carry cut No. 4 at a faster rate and with lower oxygen pressure than would ordinarily be used, thereby decreasing the possibility of scarring the tread with exhaust gases or slag. If the tread is accidentally nicked, the depression can be built up by welding, but otherwise no finishing operations are necessary. Any sharp corners or small blemishes present are soon removed in service by the hardened brake shoes.

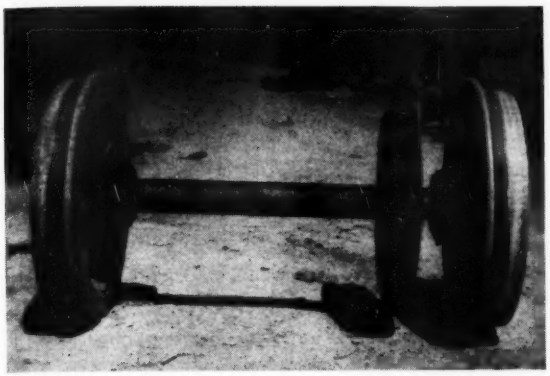
The cost of reclaiming a tire by this method is less than half that required for machining. The exact saving, of course, depends upon the size and condition of the tire. Frequently, for instance, the machining operation is complicated by the presence of hard spots and in some instances it is necessary first to remove the tire from its center and anneal it before machining.



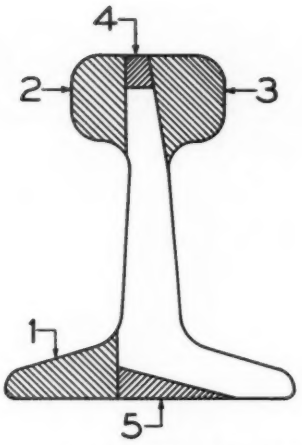
This sketch indicates the extent to which locomotive tires become worn in service



The sequence of cuts in reclaiming a worn tire



Locomotive tires reclaimed by machine-cutting at low cost



Sequence of cuts for fabricating a left-hand switch point from standard rail

Flame-Shaping Switch Points

Another ingenious use of machine-cutting is for fabricating switch points from ordinary rail at approximately one-half the cost of new ones. The sketch at upper right shows the sequence of cuts required for fabricating left-hand switch points from 30-lb. rail, while to the right is shown the actual operation for making cut No. 1. The rail is positioned quickly and accurately for the various cuts by means of a jig.

Oxy-Acetylene Gouging

Gouging is a relatively new cutting process that employs a hand-cutting blowpipe and a special gouging nozzle for the removal of a narrow strip of surface metal from steel plate, forgings, and castings. This process is being employed successfully in many industries for such varied work as the removal of defective welds, or entire welds while dismantling structures, without damaging the adjacent metal; for grooving abutting edges as a preparation for welding; and for use as a general shaping tool. An interesting use of gouging for this last operation is shown on this page, when it was desired to shape the round end of a shaft so that it would fit into a rolling-mill drive clutch.

Flame-Hardening

Finally, another oxy-acetylene process which offers opportunity for economies, particularly to the large mine, is flame-hardening, a method of heat-treating quench-hardenable steels and cast iron so as to obtain a hardened surface which is more highly resistant to wear than the original base metal. This is accomplished by rapidly heating the surface of the metal with the oxy-acetylene flame and then quickly cooling the heated area, usually in a bath or stream of cold water. The changes which take place in the metal result in a part having the highly desirable combination of a hard, wear-resisting surface with a tough, shock-resisting core. The chemical composition of the steel, however, is in no way altered. Numerous parts, such as gears, sprockets, pump levers, shafts, rolls, and feed screws, can be effectively hardened by this process, for improved service and longer life.

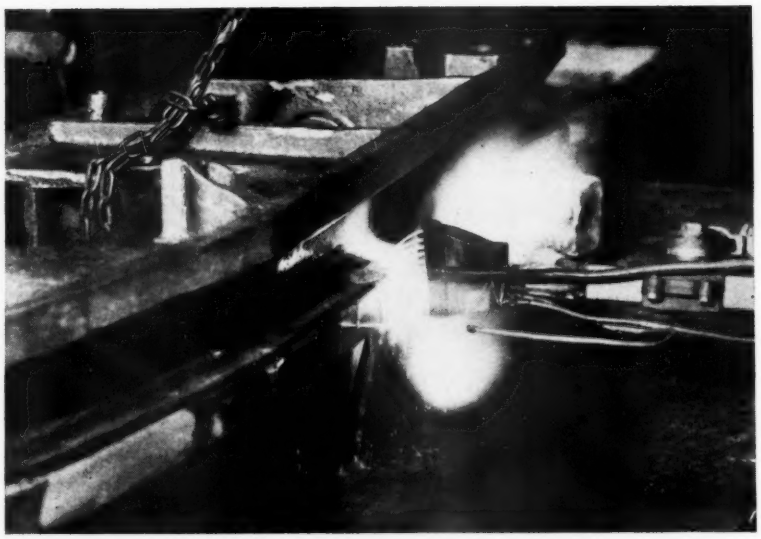
Portable cutting machine cutting flange off of rail to make a switch-point

There are various methods of applying the flame or flames and quench, depending upon the size and shape of the part. The first and most simple procedure is "spot hardening," which involves heating only a small localized area, usually by a hand welding blowpipe, and quenching it. A second method, most suitable for flat surfaces, such as guides, ways, and large gear teeth, is known as the progressive method. By this method the flames are passed at a determined speed over the surface to be hardened, with a water quench following immediately. The heating head and quench are usually motivated by a cutting-machine carriage, or a hand-propelled carriage equipped with a screw or system of levers to provide a steady rate of travel. A third method,

Splineways quickly made by the oxy-acetylene method

known as the spinning method, is used to harden round or cylindrical objects, such as small gears or pulleys. This is accomplished by spinning the part under the flames and quenching the heated portion while it is still spinning. The spinning motion can be imparted to the object being hardened by a lathe or simple power-driven jig. The fourth method is a combination of the progressive and spinning methods and is particularly suited to treating cylindrical objects, such as shafts and pump rods, of such length that the flames may traverse the part while it is being spun. An example of this method would be the hardening of a shaft by spinning it in a lathe while the heating head and quench, mounted on the tool carriage, traverse its length.

With all of these methods, a number of advantages can be realized. The process is selective in that hardness can be restricted to those surfaces, where it is needed, and the depth and degree of hardness can be adequately controlled. Large parts present no problem because flame-hardening apparatus is readily portable, and can be taken to the work.



Flame hardening conveyor rails to impart a wear-resistant surface

FLOTATION Now Improves Wheat Flour

MANY uses have been found for mining machinery, other than the primary purposes for which it is designed, but one of the most novel of these applications has resulted in a new process for separating the splintery hull or epidermis from wheat kernels, without removing from the kernels the vitamins and minerals inherent in the raw wheat. Theodore Earle, a mining engineer of California, has applied the flotation process to a method for accomplishing this, and the process is already in commercial use.

The problem of "peeling" wheat is one that has puzzled scientists ever since man began to eat wheat thousands of years ago, but until now it had not been satisfactorily solved. Scientists regard the discovery as notable for several reasons: It comes at a time when governmet nutrition authorities are demanding more vital elements in our daily bread. It was discovered not by a nutrition scientist but by a mining engineer, and he happened on the secret by accident.

One day, in his California laboratory, Mr. Earle, whose hobby is growing flowers and shrubs, and grains, was experimenting in the selection of the best seeds for germination. He was using a water-filled cell of the flotation process.

Mining engineer discovers process for milling wheat, retaining the vitamins and minerals in the flour.

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He had started an experiment to select the best wheat grains for germination when he was called to the telephone. The conversation lasted longer than he had expected and, when he returned, he was startled to discover that the hulls of the wheat had separated from the grains and were floating on the surface of the water. He continued his experiments over a period of days to develop the process and he proved beyond doubt that the method was possible of commercial production in the milling industry.

He soon interested officials of the Continental Baking Company, who purchased a flour mill and put it at Earle's disposal. Four months to the day from the morning the mining engineer walked into the baking company offices, the first flour, with all the natural elements of wheat save the rough outer hull, began to flow from the chutes of "Mill No. 2," in Kansas City. It is now producing about 1,000 barrels a day.

At an early stage, it was found that in order to put the discovery into practical operation, mining machinery was the only type that would do the job, so the flotation cells were ordered from a mining machinery company.

The steps concerned in removing the indigestible hull, or "bee-wings," of the wheat seed, are as follows: A stream of wheat and water flows as a mixture into a series of flotation cells, each of which is equipped with rubber impellor. As the stream of wheat and water passes from one cell to the next, the impellor agitates the mixture, which results in loosening the bee-wings from the wheat kernel.

After the wheat has passed through about one-third of the battery of cells, a reagent and air are introduced in order to float the bee-wings, and permit the cleaned wheat kernel to move to the outlet of the battery of cells. Not only does this process remove the hull, or bee-wing, but it also removes all dirt and foreign matter lodged in the crease of the wheat kernel. The last cell discharges its mixture of clean wheat and water into a centrifugal machine, which throws off the larger volume of water and, after that, the wheat is carried on a conveyor belt to a dryer.

(*Continued on page* 45)

ADEQUACY of CERTAIN MINERAL RESOURCES*

Part II

Major Metals

Part I of this article appeared in the June Journal. Part II, on Major Metals, concludes Dr. Finch's authoritative discussion.

PHOTO BY U. S. BUREAU OF MINES

Looking East toward Chrome Mt., Benbow, Mont., where large deposits are being developed

By JOHN WELLINGTON FINCH
Consulting Engineer, New York City
and former Director,
United States Bureau of Mines

YOU are all familiar with the fundamental position of iron and its products in present-day industrial civilization. This metal will not be discussed, except to state that we probably have abundant reserves of ore and the most efficient reduction and fabricating plants in the world, ample in capacity to supply our ordinary needs and possibly the steel requirements of military preparation. The industry is so thoroughly experienced that it can deliver its products rapidly in acceptable forms if it is free from uninformed interference and if it has the cooperation of the vast army of labor necessary for capacity operation.

Copper, lead, and zinc, although they are not listed by the Army and Navy Munitions Board as either "strategic" or "critical" metals, are required for defense in enormous quantities. There is smug assumption that adequate reserves of these materials exist, and that production is certain. It is not sufficiently realized by people outside the mining industry that mere tons of ore in the ground do not necessarily assure defense supplies. There are economic factors to be considered and plain common business sense needs to be exercised or the flow of these raw materials will be hampered.

The production and fabrication of these metals is a gigantic industry directly involving the labor of thousands, and essential in the modern life of all our citizens. These industries are delicately balanced yet ponderous mechanisms, slow to acquire momentum, and equally slow to reduce speed when in full motion. That is their strength and their weakness.

Copper

Let us consider copper, the most vitally important of the three major metals in national emergency, or at any time, and review the lessons recent years should have taught us. Since this is a discussion of adequacy of resources, a few preliminary words upon reserves in the ground is appropriate. You probably know there are two main types of copper deposits: (1) veins or lodes, such as those at Butte, Bisbee, and Cananea; (2) low-grade ores disseminated in immense bodies, generally known as "porphyry copper" deposits such as those at Bingham, Ely, Miami, and Inspiration. Estimates of ore in the ground cannot be made accurately for the vein mines, but is well known for the porphyry ores that have been explored by drilling. I believe at proper prices we can surely count upon reserves of commercial minable ore in this country for at least 15 years. Together, American and British citizens own foreign copper mines in South America and Africa with reserves that can supply for half a century or more all aver-

age world demand. In recent years, more mines have been exhausted and abandoned than new mines discovered in this country. In fact, so thoroughly has prospecting been done that important discoveries in the future are increasingly unlikely.

In passing, the comment should be made that large quantities of low-grade ore are left in the ground and irretrievably lost when the price of copper does not enable such ores to be mined at a profit. The life of United States' reserves would be extended many years if the metal were to command a price of 5 cents more than present quotations.

The refineries of this country have a capacity to produce 3,000,000,000 pounds of copper per year from domestic and foreign sources. Also, ordinarily, about 500,000,000 to 800,000,000 pounds of scrap copper is recovered annually. We can expect, therefore, 3,800,000,000 pounds of metal to be forthcoming if the price is such that operators can afford to produce it. Of this around 1,000,000,000 pounds would have to be obtained from foreign ores.

We are not looking for the runaway prices of the first World War. There appears to be no reason why there should be such hectic buying as was done in those times. Nobody wants a repetition of the distress caused to producer and consumer alike, but if a price is to be fixed, or a ceiling created, it must take into account the rapidly changing conditions that now begin to affect every factor entering into the course of production. The Government should be prepared to modify the price as these conditions demand.

The situation has changed radically since the last war. A very large copper production has developed in other countries. Although the United States is still the largest producer, we have lost the proud position we formerly occupied in the copper world. Before the depression, our output of copper was more than that from all the balance of the world together. In 1937, a relatively good year, our share of world production was less than one-third, and in 1938, it dropped to about one-quarter. However, we can still make more copper than any other country or any other continent. The new outside developments have been principally in British territory. Great Britain and the United States own over 80 percent of the world's reserves. Great Britain is using all of the production from Canada and the other countries in the commonwealth of nations.

In 1932, when many of our mines were closed, a duty of four cents per pound was placed upon copper imports. This has continued to the present. American fabricating plants were able to keep themselves going by using foreign copper and reexporting the fabricated product, receiving a drawback of 99 percent of the duty. They are now able to manufacture finished military products for Canada and England under this procedure.

Mexico and South American countries can ship copper to us without obstacle. As defense needs require it our government evidently plans to utilize the friendly relations with South American countries and Mexico where major American corporations are producing, in order to supply our own needs and the needs of our friends who are now at war.

Contracts have already been made for the sale and prompt delivery of more than 250,000 tons of copper from Latin America. American reserve stocks of refined copper have been exhausted. Domestic production is at peak under present conditions. The domestic supply is woefully inadequate to take care of our national defense program. Even if all Latin American copper is made available, a shortage will still exist. Good neighbor policy toward the Latin American republics will be fostered by eliminating all difficulties in the exchange of goods where such modification would not injure the American producer. It would seem that the time is ripe, without repealing tariffs or in any way changing the basic legislation now in effect, to suspend the tariff on copper for the period of the emergency by a simple resolution of Congress. This could be accomplished with the provision that such suspension was to continue only for such time as the proper authorities charged with national defense would certify domestic production to be inadequate. Such action would not only benefit ourselves but would greatly encourage the good neighbor relations with our friends to the south.

Experience in the First World War

Before the war, there was no indication that military operations would create great new demands for copper or for a large increase in prices. In fact, the earliest effects of the last war were an actual falling off of demand and general demoralization of the industry. The average price in the first six months of 1914 was about 14 cents per pound. There were no quotations in the next three months, then a price of 11 cents was quoted, and American producers were discouraged. But, thereafter, the war rapidly became one such as we had never imagined—a war not only of men, but of machines. These machines and the vast quantities of necessary munitions began to use copper by the shipload from this country and it had to be produced. Prices began to skyrocket up to 20 cents by June, 1915; 22 cents in December, 27 cents in February, 1916, and to 33 cents by December of that year, with some sales at even higher prices. Price was no object to the Allied governments. Their purchases and contracts were for more copper than existed above ground. Therefore, capacity had to be increased no matter at what cost of plant or expense of production. In 1916, consumption increased to 1,420,000 tons of primary copper. In September, 1917, the price was fixed by agreement at 23.5 cents per pound, after we entered the war. Deliveries jumped to 1,588,000 tons for that year.

Peacetime uses of copper were completely wiped out. The metal was entirely under the control of the War Industries Board. In 1918, the cost of labor, supplies, and of freight advances, after the government took over the railroads, had so greatly increased that the price of copper was advanced to 26 cents a pound in July, and it remained there to the end of the war, and into December, 1918. After this, there were no quotations until February, 1919, when the nominal price became 18.375 cents. At the demand of the government, every effort had been put forth to make the greatest possible output. Plants had been extended at enormous cost. Production became far in excess of war requirements or the ability of the United States and its Allies to fabricate. The industry pleaded with the government to permit production to slow down; operators were ordered to continue at full capacity even after the Armistice.

War profits had come to an end. The lean years of deficits and readjustment followed. Copper lost far more than it gained from the war, and suffered more than any other war commodity. At the end of the war, there

were enormous quantities of metal on hand at the refineries and fabricating plants, in the hands of producers, the government and Allied powers. To aggravate this condition, hundreds of millions of pounds of copper were reclaimed from the battlefields and from munitions scrap. Stocks continued to increase, and prices to fall until, in 1921, the industry was threatened with ruin and practically all mines were forced to suspend operations. In 1922, some operations were resumed even though stocks were still unusually large, and prices the lowest in the history of the country. Mining was resumed because mining and smelting in most districts are the only support of the populations, and it was important to retain competent employes and restore to them their means of living.

To summarize the ups and downs of 25 years of copper mining:

In the war period, at government instigation, there were enormous expenditures in over-equipment and over-production. Stocks carried over from the World War lasted until 1928, about 10 years, and production had been held down to less than demand. World War profits were a snare and a delusion. In the late 20's, there was a short spurt of profit-making because consumption had increased and prices quoted were higher than for many years. This caused production almost immediately to exceed consumption, and stocks accumulated again. The industry was apparently slow to take warning because of the social conditions already mentioned, and the immense expense attending the closing down of great plants delayed proper adjustment. Only after the Wall Street crash in 1929 did the industry as a whole begin to reduce production to demand, but it was more than a year before effective curtailment could be accomplished. Then, the weight of surplus stocks drove the price of copper down to 4.7 cents a pound from December, 1932, to March, 1933, well below the direct operating cost of the cheapest producer in the country.

The average direct operating cost was around 9¼ cents per pound. Including depreciation, depletion, interest, and overhead for the three years from 1928 to 1930, the U. S. Tariff Commission found that the total average cost was 13.4 cents after deducting the value of by-product precious metals. This figure did not include taxes. Interest was calculated at six per cent on the depreciated value of fixed assets and this amounted to 1.47 cents per pound of copper.

Then followed six years through the depression that were worse than barren. Dividends stopped when surpluses were wiped out, borrowing became necessary, mines and smelters closed at a cost of many millions of dollars, not for loss in business but for actual expenditures. Such costs amounted to about $4,500,000 for one major company.

The National Industrial Recovery Act of June, 1933, accomplished considerable good during its short life. A Copper Code was enforced in 1934, and continued to June 15, 1935. Surface stocks were gradually reduced, foreign demand increased, and prices slowly advanced to a maximum of 9.5 cents to the end of the third quarter of 1936. Then, early in 1937, a repetition of 1928 and 1929 conditions began. A buying wave moved the price up to 11.77 cents in December, 1936, and continued in volume until a peak price of 16.77 cents was reached on March 31, 1937. The end of the depression appeared to have arrived, but, in the spring of 1937, there was a sudden reversal of public sentiment. Confidence had been destroyed, buying ceased, prices dropped to 9.9 cents, and production again was curtailed. Until 1939, average prices fluctuated from 9.77 cents to 11 cents a pound.

The Present War

The present European war started in September, 1939, and was followed by a huge demand for copper beginning in July, 1940. Prices advanced only moderately, as compared with those of the first World War, for they rose only to 12.27 cents a pound. Just now, there is a margin of profit, if some of the items of costs included by the Tariff Commission were disregarded but, if calculated on the proper basis a 12 cent price is subnormal and adequate only for the lowest cost producers. There has been no real profit in the industry for the past 10 years, yet there are those who know so little about the business that they have accused copper producers of profiteering. Copper people believe they helped to win the last war. Yet, they have earned, on the average, for the past 25 years very little interest on their vast investments and the risks they had to take.

So, what have we learned? Probably most important of all, that larger price allowance should be made on account of the ups and downs of the

PHOTO BY U. S. BUREAU OF MINES

Diamond drilling by U. S. Bureau of Mines on an antimony-tungsten project in Valley County, Idaho. In the drilling, valuable deposits of tungsten were discovered

copper business than for any other factor.

It is evident that the copper producers have made mistakes. They admit these and wish to profit by their experience. It is hoped they will be free to do so. They do not wish to start again on the same futile cycle through which they have passed more than once, but hope this time they will be allowed to proceed on a business basis.

Zinc

Zinc is the second of the major metals to be considered, and the one whose refining has been dislocated the most by the European war. As is the case of nickel, ample zinc is ready to meet all military requirements, but the outlook is that rationing zinc for peace uses will be necessary for the next two years, although it is likely that in 18 months not only all military demands but also 90 percent of normal peace-time requirements will be satisfied.

The United States is the largest producer, as well as user, of zinc in the world. The start of the present war resulted in a marked increase in our output and reduction in our stocks of refined zinc, on account of large orders for shell cases and other brass fabrications and many die-casting products. Then the sudden conquest of Norway, Holland, France, and especially Belgium, brought an unexpected heavy demand upon our refineries because much of the world's refining capacity located in those countries had passed into the hands of Germany. It was necessary for Britain to turn to the United States to supply the deficiency in refineries to treat the ores from the provinces. The mines and reduction plants of Poland, where the Anaconda Company had established a successful industry at great expense, have been confiscated.

The capacities of existing American plants have been increased as much as has been possible, and several new refineries are being constructed. Nevertheless, supply for normal peacetime requirements must remain precarious as emergency stocks are built up during the balance of this year. The shortage is not in ore reserves but in refining capacity outside Europe and it takes time to provide such facilities. Domestic ore production is increasing slowly, with Butte and the tri-state field most able to increase output. We must depend upon available foreign ores for a rapid increase of zinc production. These ores will have to come mainly from Canada, Mexico, and possibly from Australia, if we make large munitions shipments to Britain in the coming months.

While some think it may be necessary for us to supply most of the zinc needs of China it will probably prove easier to do this from Australia and Burma.

The main demand is for high-grade zinc. Fortunately the United States has led in electrolytic refining of the metal. Because of our large supplies of electric power it has been possible to increase electrolytic capacity fairly rapidly. Also, there has been great recent improvement in furnace refining which now produces zinc 99.9+ percent pure, fully equal to electrolytic zinc.

Unfortunately the increased demand came suddenly upon an industry weakened by a tariff insufficient to prevent invasion by foreign zinc. Our regulating agencies have failed to realize that American producers of zinc are heavily handicapped not only by higher wages and higher prices for supplies, transportation and equipment, but also by the fact that the average zinc content of foreign ores is around 10.8 percent, compared with approximately 5.6 percent for United States ores.

Despite all these handicaps, we can take pride in the fact that the United States zinc industry has responded wonderfully in this all-important emergency. Slab zinc output was one-third higher in 1940 than in 1939, establishing a new peak, with production of high-grade zinc 81 percent higher than in 1939, and prime western output 17 percent higher. But try its best, it probably will be impossible for producers to increase output of primary metal to more than 800,000 tons in 1941 compared with 675,000 tons for 1940, while the best opinion of the industry appears to be that in 1942 around 1,000,000 tons will be needed. Probably only somewhere between 50,000 and 60,000 short tons of scrap zinc a year will be recovered in the next few years because with higher prices and urgent demand, accumulations of scrap in this country have been pretty well cleaned up. No great increase of plant scrap is to be expected since much of the increase in zinc output from our refineries promises to go abroad for manufacture in the British Isles and India. Export tonnage is expected to increase materially both this and next year along with our own expanded manufacture of war material. The curtailment of use in automobile parts and for other normal purposes, as we concentrate our efforts more and more upon the production of munitions and armaments, will probably result in a 10 percent reduction in peace-time uses by rationing until some time in 1943 at the earliest. Furthermore, production for our needs is predicated upon no curtailment of electric power in the next three years and ample shipping facilities to bring foreign ores to our refineries. The federal government through the O.P.M. has wisely begun to build up fairly rapidly an emergency reserve of refined zinc. It may be important to note that stocks of 160,000 tons of 48 percent zinc concentrates at mines in Chihuahua, Mex., though somewhat high in iron, can be utilized if there is delay in shipments of foreign ore by sea.

The large zinc-ore reserves now accessible to us are in British Columbia and Manitoba in Canada, Australia, Mexico, and in the Butte, New Jersey and tri-state districts in the United States. It is estimated that the zinc mines of the tri-state field still contain 75,000,000 tons of ore that is commercial at present metal prices, although for more than half a century that region has been the most important source of zinc production in this country.

The situation has been saved by allowing the price of zinc to increase until there is a profit incentive sufficient to encourage rapid increase in domestic zinc refining facilities.

Lead

The apparent consumption of lead in 1940 was 655,000 tons, more than double that of 1939. Of this, about 77,000 tons was from foreign sources and 13,400 tons was secondary lead. The average price was 5.18 cents a pound compared with 5.05 cents in 1939. Lead production costs are helped by the sales of by-product silver, that accompanies all lead ores except those in the tri-state district and the southeast Missouri field. Costs of production are increasing but the industry is on a reasonably sound basis at present prices.

Most of the production comes from complex ores in which lead is associated with zinc, as well as from many deposits that have an important content of copper. Separation by flota-

(*Continued on page 45*)

PROGRAM COMMITTEE MEETING, SAN FRANCISCO, JUNE 24

Left to right, outside of table: Norman Cleaveland, Chas. M. Romanowitz, Percy G. Dobson, J. B. Haffner, M. W. Hayward, Julian D. Conover, James W. Wade (National Chairman of Program Committee), Wm. C. Browning (Chairman of Western Division), Carl J. Trauerman, James L. Bruce, Estey A. Julian, Robert M. Searls, Worthen Bradley, and Russell C. Fleming.
Left to right, inside of table: H. U. Maxfield, John Rogers, Gloyd M. Wiles, F. W. Nobs, H. S. Lord, and Carl Zapffe.

METAL MINING CONVENTION PLANS UNDER WAY

THE 8th Annual Metal Mining Convention and Exposition of the American Mining Congress, Western Division, will be held in San Francisco on September 29 to October 2, inclusive. The time has been selected to insure a most complete and pleasant visit to San Francisco and the West Coast. Those who live in San Francisco or those who have been there in the fall report that the latter part of September is a delightful time to visit there, both to attend the convention and for trips to many points of interest on the coast and the mining districts inland.

The Program Committee, shown in action above, and headed by Chairman James W. Wade, met at the Fairmont Hotel, San Francisco, on June 24 to outline plans for the convention that will include consideration of the vital problems confronting mining men today. Present at this meeting were many of the state and district chairmen, as well as W. C. Browning, chairman of the Western Division, and other prominent mining men who are taking an active interest in the success of the fall convention.

In modern warfare metals play a more important role than ever before and, as the effort of our country to secure adequate defense mounts, the output of the metal mines becomes of ever more vital import; and foremost in the minds of mining men today are the problems relating to increased production of metals for defense purposes. This has been recognized by the selection of the slogan, "Metals for Defense," as the keynote of the coming convention.

The committee had before it suggestions received from hundreds of mining men throughout the country. A program was drawn up which will cover mining's part in the defense program and the many new problems created by critical world conditions. Strategic minerals will receive special attention. The importance of gold mining and the need for adequate priority consideration on mining equipment will be thoroughly brought out. Taxation, labor relations and economic problems of the mining industry will be considered, and there will be special sessions on practical mining and milling problems of wide interest to operating men.

Convention Program

The program as tentatively arranged by the committee will bring up for consideration many significant matters, including:

Strategic Minerals

Because of the intense and widespread interest in this subject, special attention will be given to it. Reviews will be given by authorities on the major and strategic metals so neces-

sary to defense; this will include a discussion of the present situation in copper, zinc, lead, iron ore, manganese, tungsten, molybdenum, chrome, vanadium, mercury, antimony, gold, potash and borax.

Labor Relations

The establishment and continuance of harmonious relationships between labor and operating personnel requires deep thought and careful attention. Cordial, personal relationships must be established, and the entire personnel of the industry from top to bottom must work harmoniously, if the mines are to work to the limit of the country's needs.

Priorities on Equipment

Without maintenance and repair parts and new equipment the mining industry will not be able to meet the demands now being made upon it. Recognizing the necessity of maintaining production from the mines, the Priorities Division of the OPM in Washington has already taken certain steps and has under consideration further action in granting priorities to the mining industry for the vitally necessary supplies and equipment. This can only be done, however, if the real needs of the industry are known and evaluated correctly. A thorough discussion of priorities at the convention will aid in clarifying the situation that mining men are facing.

Price Control Policies

Mines generally throughout the country are now working at capacity, and yet there are clamorous demands for an increased production of the major metals. With prices of these metals fixed by governmental decree and with mining costs rising, it is problematical how much increased production can be made in the near future. How best to accomplish the desired results without aiding in starting an inflation spiral will be discussed at the meeting.

Taxes

The proposed governmental tax program will mean that all branches of industry must soon prepare to meet increased taxation. No question is of greater moment to mining than the manner in which these taxes are applied, the amount the mining industry will be called upon to pay, and particularly the effect that new forms of taxation will have on the development of new resources.

Geology

It is proposed to have a session headed by a panel of mining geologists for the consideration of the problems of mining geology, and the part that geological exploration must play in the finding of ores.

Review of New Developments and Equipment

New developments in mining and milling methods and equipment are of the greatest interest to all operating men. A session will be devoted to this phase of the industry. Operating and technological improvements of the present, as discussed at this session, will serve as an indicator of what the industry can do in the future to improve practice and maintain low cost.

Wage-Hour

With governmental controls over wages, working hours and working conditions becoming more rigid, a clear understanding is needed as to the status of mine lessees under the wage-hour act, and as to the validity and import of the recent "collar-to-collar" ruling. These questions will be discussed from all angles.

State and District Chairmen of the Program Committee serving with General Chairman James W. Wade

D. BRADFORD
Montana

PATRICK BUTLER
Lake Superior

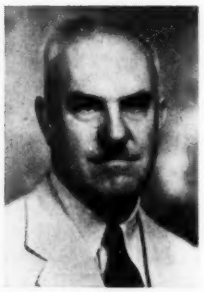
WM. J. COULTER
Colorado

(Not shown)
A. S. WINTHER
Arizona

G. DOBSON
Nevada

WM. H. GOODRICH
New Mexico

J. B. HAFFNER
Idaho



M. W. HAYWARD
Texas

ENS JENSEN
Washington

H. UTLEY
Tri-state

ESTEY A. JULIAN
California

H. A. WALKER
South Dakota

WILBER JUDSON
East-Central

GLOYD M. WILES
Utah

ERNEST N. PATTY
Alaska

H. C. WILMOT
Oregon

The RFC and Procurement of Defense Metals

Through the strategic metals procurement program and the granting of loans for mining exploration and development, the RFC has been playing an active part. An authoritative speaker on these activities is being sought.

Power Production and Mineral Development

Availability of cheap power in the Northwest through the completion of tremendous dams in that area, make economic many metallurgical processes and mining developments not hitherto considered feasible. The Northwest is already embarked upon a large industrial expansion program based upon cheap electric power. The bearing of this upon our present mineral needs will be the basis of one of the major papers to be presented.

Stream Pollution

The present status of State and Federal action in regulating the deposit of mine wastes in the natural waterways will be discussed. This problem has received particular attention in California, where workable means of control are being developed in such a manner as not to interfere unduly with mine operations.

Effect of Government Controls on Exploration for Mines

The effect of all the new government controls—in labor matters, social security, taxes, compensation, etc.—upon prospecting and exploration for new mines will be analyzed and thoroughly discussed.

Placer Mining

The growth of the placer industry has brought to the fore many new problems in the operation and maintenance of dredges and dragline equipment. Hydraulic mining is receiving increased attention. One session will be devoted to these subjects.

Operating Progress

Sessions will also be held for discussion of new developments in loading operations underground, haulage, drilling and mining in general, as well as on new developments in milling and related subjects.

Entertainment and Trips

The Entertainment Committee, under the able chairmanship of Errol MacBoyle; the Ladies' Committee, with Mrs. F. W. Bradley as chairman; the Finance Committee, with F. C. van Deinse as chairman; the Reception Committee, with Wm. S. Boyd as chairman; and the Trips Committee, with Henry W. Gould as chairman, are cooperating under the able leadership of Philip R. Bradley and Albert F. Knorp as general chairman and vice chairman of the Arrangements Committee, to provide the various social functions, entertainment features and inspection trips of the convention. The Publicity and Attendance Committees, under the chairmanship of Chas. H. Segerstrom and F. W. Nobs, respectively, are seeing that mining men generally are informed of the many convention attractions, to insure a large and enthusiastic attendance. The hospitality of San Francisco is famous, and all who come may be sure of a most enjoyable visit in the Golden Gate City.

P. R. BRADLEY
General Chairman

Arrangements Committee

A. F. KNORP
Vice Chairman

MRS. F. W. BRADLEY
Ladies

W. S. BOYD
Reception

ERROL MacBOYLE
Entertainment

F. W. NOBS
Attendance

CHAS. H. SEGERSTROM
Publicity

F. C. VAN DEINSE
Finance

H. W. GOULD
Trips

Exposition of Equipment and Supplies

Space has already been reserved by a host of mining equipment manufacturers for displays of all that is new and interesting in mining equipment and related items. Demand for space has exceeded the facilities. Manufac-

(*Continued on page 45*)

With the COAL DIVISION

of the AMERICAN MINING CONGRESS

DETERMINATION OF SCREEN EFFICIENCY

● ***A Report to the Committee on Surface Preparation by George L. Arms***

THE writer has at times felt that the methods in use for determining the working efficiency of the various types of screening were not as informative as they might be, in that they do not take into consideration all the factors entering into the processing from the raw material to the finished product. I wish to emphasize the fact that I recognize the complexity of setting up methods that take in all the essential factors, but I believe that if such a thing can be evolved, and its adoption made general, a distinct service will have been rendered to the industry.

The problem is perhaps best set up for us by a consideration of what is meant by "Efficiency." In the first place, the term carries with it an implied process, or change of condition of the material under consideration, and in the accepted sense, efficiency is usually a number that is the ratio between actual performance and the perfection of some test of the raw feed.

At the very start, when considering screens of all kinds, we are confronted with a wide variety of shapes of perforations through which the material must pass. Before it is possible to fix a value for the raw material for later comparison with the finished product, it will be necessary to set up *some standard method for fixing* the shape and size of opening to use in each case for determining the amount of material in the feed that will be considered "oversize" and "undersize." The present ASTM series of test screens are probably adequate for this purpose. The job of settling the standard relationship between the square mesh screens and the various shapes and sizes in commercial use is *another* problem, and it is further complicated by the varying slopes of different screens, and the effect of the projected opening of the perforations in use on the volume and shape of the through product.

In a study of the efficiency of any given screen separation, it would seem necessary to have some fixed standard of comparison by which to gage any individual performance. If testing were always done by standardized methods, the data would then be more directly comparable, and less speculation would be involved in the visualizing of the product of any given plant screen. In any case, it would seem logical to say that the efficiency rating of any plant screen separation should be entirely independent of the actual type of screen surface in use. In other words, the use of an oversize round or square hole, a slotted perforation or lip screen construction should have no bearing on the efficiency rating of the separation as determined by the fractions of undersize in the overproduct, and oversize in the through product, using the standardized methods of test.

There is now a tendency to use the percentage of undersize remaining in the screen's overproduct as an expression of the screening efficiency. While it is true that this information is a direct matter of importance to the screen user, and represents to him the quality of the product, it does not convey any hint as to how effective the screen unit has been in the removal of undesirable fines. Or in the case where the undersize is the desired product, it does not tell how complete the recovery has been.

To cite a specific case, the writer was recently told that the overproduct of a certain screen contained 15 percent of undersize when tested on a sieve that was assumed to be the equivalent of the screen cover in use, and that therefore the screen was 85 percent efficient. There is nothing in such a statement to indicate that there was any more than 15 percent of undersize in the original feed to the screen, although as a practical proposition we know there must have been.

After a method of rating screen performance is set up, there must be an *accompanying method* devised for evaluating the difficulty of processing the kind of material making up the feed. Other things being equal, it would seem logical that the relative difficulty of screening material at a given mesh is a function of the amount of material in the raw feed that is very close in size to the openings through which it must pass. Therefore the difficulty of any specific problem could be expressed by the percent of the feed that lies within standardized limits larger and smaller than the test screen openings.

It would be obviously unfair to compare the work of two screens if one of them is under a feed that is twice as hard to screen as the other, so our efficiency figure must be supported by some measure of the toughness of the job on which it was achieved.

Any method for evaluating the efficiency of a screening separation must include a measure of the inaccuracy both ways. This is again a penalty imposed by the varying shapes of perforations and the varying slopes of screens on which they are used. If we take for instance an inclined screen using sharply elongated openings, we will find on testing the products that we have oversize in the through product as well as undersize in the overproduct, assuming a round or square mesh test screen. *Both of these are a part of the screen's performance, and should enter into the measure of the screen's efficiency.*

Certain materials that must be screened are affected to a marked degree by their physical condition. When dealing with coal, the screen designer must keep a wary eye on the moisture content of the feed particularly in the

presence of clay, and if the separation is to be made at a small mesh. The surface moisture of the feed should be a *primary* factor in the determining of the "difficulty index" and practical limits for moisture set up, beyond which would lie the zone of meager effectiveness.

To summarize the foregoing, I would set down the requirements for determining and studying screen performances as follows:

(1) The adoption of standard test screens and the standardization of their relation to the various screen openings and slopes in commercial use.

(2) The evolvement of a method of rating screening efficiency which makes the figure denoting the efficiency a ratio between the actual plant screen separation and the perfect separation established as possible by the test screens.

(3) The establishment also of a means for determining the relative difficulty of screening problems, to the end that the efficiency figures may be more directly comparable.

Suggested Measure of Efficiency of Screen Separations

I would like to suggest here that for item 2 above, screening efficiency might very well be expressed by the *sum of the fractions of material in the products of the plant screen which have reported to the proper place*, written as *fractions of the original raw feed*. The sum of such fractions in the original test would always be 1.00 (or unity) and the performance ratio would consequently always have 1.00 for a denominator, thus making the numerator a direct numerical expression of the approach to the perfect performance of the test sieves. Certain formulae for calculating the efficiency will be given below.

The only testing of products necessary for using the proposed formulae would be the usual determination of the fractions of undersize in the through product and oversize in the overproduct. With these the through product of the plant screen can be calculated as a fraction of the feed by using formula (1) below. In order to secure the required data on feed and products for use in the formula it will be necessary *in each case* to select the size opening "W" in the test screen to be used, this to be selected for this purpose from some standardized series of sieves to be adopted.

The following method of calculating screen efficiency is suggested:

Formula (1) Through product "T" of plant screen as fraction of feed,

$$T \text{ equals } \frac{A-a}{1-(a+b)}$$

Where

- A equals plus "W" material in the feed to the screen, as fraction of feed.
- a equals plus "W" material in the overproduct of the plant screen as fraction of overproduct.
- b equals minus "W" material in through product of plant screen as fraction of through product.

For example, assume a feed to a plant screen that shows A to equal .48 material retained by the test screen "W". Assume further that tests of the products of the screen show that .92 of the overproduct is retained by the test screen "W", and that .95 of the through product passes the same test screen openings. Then substituting in the formula,

$\frac{.48-.92}{1-(.92+.95)}$ equals T or .5057 of the feed.

Formula (2) *Efficiency* "e" *of Plant Screen*

e equals $Tb+(1-T)a$

Where T equals through product as fraction of the feed

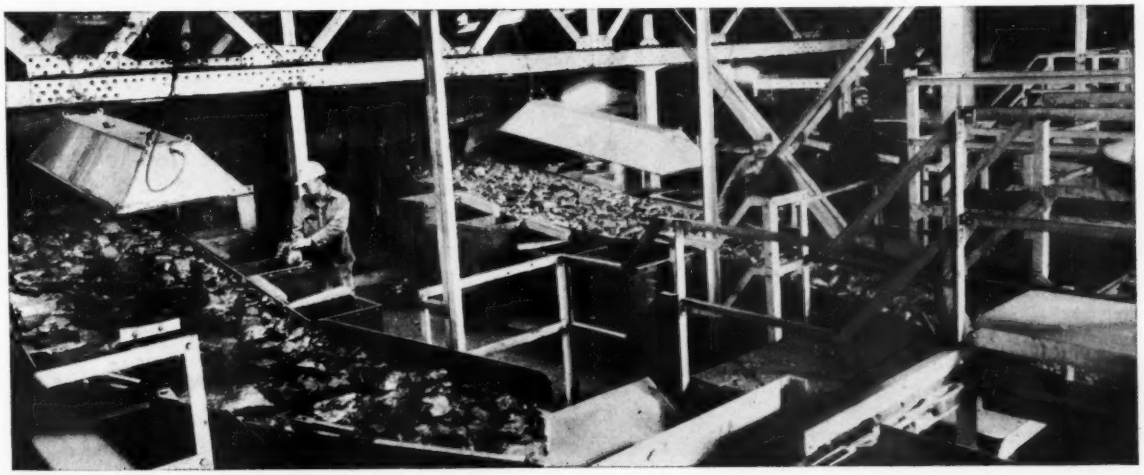
Substituting,

e equals .5057 x .95 + (1—.5057) .92
or .4804 + .4547 equals .9351

The plant screen efficiency in this case is therefore 93.51%.

In reporting a screening efficiency, full data should be given as to size and shape of perforations, slope of screen, motion, dimensions, actual area of screen surface, and the maximum, average and minimum rate of feed.

I have submitted the foregoing with the hope that it will be found constructive, and with the remark that I think there is a definite need for some such measuring stick for screen performance. In justice to the many fine pieces of screen equipment that are available to the industry, I believe there should be some effective way of measuring the work they are doing and recording it. I believe further that such a way of rating performance would help prevent the unfortunate cases of misapplication which we all know are so costly and discouraging.



GENERAL NOTES ON SCREEN EFFICIENCY CALCULATIONS

By G. R. DELAMATER

Chairman, Subcommittee on Coal Screening

+ + +

THE papers by Thomas Fraser and George L. Arms published in this and a recent issue of the Journal are of merit and it is hoped will bring considerable discussion from the field.

Before going further I wish to suggest the great need of clarifying the use of the terms "oversize" and "undersize." It is quite common practice to call the product over a screen "oversize" and the through product "undersize."

In the past few years the bituminous coal industry has followed the example of the anthracite industry in the preparation of many sizes of coal, in fact, has gone much further in this regard.

Where a tipple is producing several sizes of coal, each should be called a "product" such as egg coal, nut coal, stove coal, stoker coal, etc. For each of these a top and bottom size limit is or should be set. For example, if a certain nut coal is intended to be, say ⅜ in. sq. x ¾ in. sq., the screens installed to make these separations may have square openings of these sizes, but they frequently have openings of different sizes or shapes which are supposed to give an equivalent separation. However, all coal actually passing through the screen which is supposed to make the ¾-in. separation, and over the screen supposed to make the ⅜-in. separation is "product." Then any part of the product retained on a ¾-in. square opening test sieve is "oversize," and any part passing a ⅜-in. square hole test sieve is "undersize."

It is my suggestion that all material passing over a given screen be termed "over product" or "overs" and all material passing through be termed "through product" or "thrus." This will avoid much confusion. On two deck screens the intermediate "product" should be so designated.

In recording all such data care must be taken to specifically state the test screen openings as they actually are; i.e., "square" or "round," etc. The name of the scale to which the test sieve belongs should be stated such as "U. S." or "Tyler," etc. It would, of course, be helpful if some one standard could be adopted for all coal work.

There are many differences of opinion regarding what should constitute screen efficiency. Lacking a generally accepted formula the screen manufacturer can only talk in the terms used by his customer and in the coal industry the majority of inquiries come from companies not employing highly technical men familiar with intricate formulas of any kind. It is the writer's experience that the more commonly used definition for screen efficiency is that an overscreen product containing 8 percent undersize is a 92 percent screen efficiency. It will take a lot of education to overcome that practice.

This but confirms the great need of the adoption of a correct and not too complicated formula and the wide broadcasting of a standard form to record test data and calculate the resulting screen efficiency.

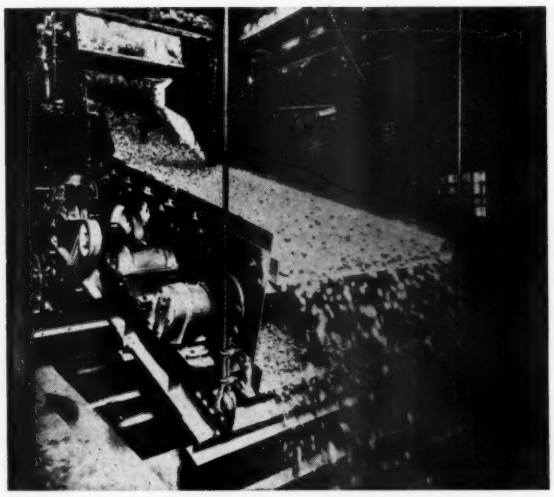
Some opinions submitted show a desire to have the screening efficiency formula include details of screen setting, adjustments, shape of opening, etc. While such data should be recorded for obvious reasons, they should be in no way included in the efficiency formula.

Given a reliable screen analysis of the feed to a screen, the overscreen and throughscreen products, the Arms formula is ideal for determining the percentage of these two products. Beyond that Mr. Arms' formula determines the average efficiency resulting from the separation made by the screen, this based upon both of the resulting products of the screen. Expressed in another way, the formula determines the amount of the overscreen product which is true "product" and the amount of the throughscreen product which is true "product" and the sum of these two figures is the efficiency of the separation accomplished by the screen.

In instances where the overscreen product is the only one of interest, the Arms formula would apply nicely, using only that part of it having to do with percentage of material passing over the screen and from this, determining the actual amount of it which is true "product." This amount divided by the true product *in the feed* would be the screen efficiency.

I do not think that the shape or size of opening used on the screen deck need be given any consideration so far as screen efficiencies are concerned. Different types of screens will require different screen openings to attain a given or like screen efficiency. The important figure then is, what screen area is required to attain that result, and here the real advantage of one screen over the other is shown.

Following that would come the other governing features such as power consumption, head room, operating and maintenance costs, etc. These must not be confused with screen efficiency data.



DISCUSSION OF SCREEN EFFICIENCY FORMULA

By T. W. GUY, Chairman
Committee on Surface Preparation

THE formula by Mr. Arms, proposes an efficiency figure which, neglecting degradation, is the sum of the *percentages of the feed* found in the *proper products* after the *plant screen separation.* In the example given, the efficiency of 93.5 percent means that 93.5 percent of the feed was found in the proper screened products, and 7 percent in the wrong products.

The relationship of through product to the feed is given by formula (1), and then the percentages of the total Plus W material and of the total Minus W material as found in over and through products are readily calculated. Of course, all these must be considered in finding the adjustments and the exact size and shape of openings to give the *most satisfactory and economical* separation in a given case. This may require only a partial separation in one case, while in another, a very thorough separation is necessary.

Each reader interested in this subject is urged to prepare and study some actual data, with which he is familiar, on the tentative form sheet given herewith, and to send his criticisms and suggestions, the source of which will be treated as confidential, to the Coal Division of the American Mining Congress. Such suggestions will be passed on to the Surface Preparation Committee and will be extremely helpful in completing the committee's final report.

TENTATIVE FORM SHEET
Data and Calculations for Efficiency of Screen Separation
G. L. Arms Formulae

Code No. of Data ....

"W" Test Sieve * Data Size Coal W Sieve	Feed to Plant Screen		Perforations 065-in. Sq. (10 M.) Products of Plant Screen: Overproduct		Through Product	
	Symbol	% Feed	Symbol	% Product	Symbol	% Product
Plus W	A	48.0	a	92.0	1—b	5.0
Minus W	1—A	52.0	1—a	8.0	b	95.0
Total	F	100.0	OP	100.0	T	100.0

Formula 1 Through Product "T" as Fraction of Feed

$$T = \frac{A-a}{1-(a+b)} = \frac{.48-.92}{1-(.92+.95)} = \frac{-.44}{-.87} = .5057 = 50.57\% \text{ of F.}$$

Overproduct, "OP" = 1—T = 1.00—.5057 = .4943 = 49.43% of F.

Formula 2—Efficiency "e" of Plant Screen Separation

$$e = Tb + (1-T)a = .5057 \times .95 + (1-.5057).92$$
$$= .4804 + .4547 = .9351 = .9351\%$$

Summary from Above Data

Item		
O(1)	Plus "W" Material in Feed, Percentage of Feed	48.0 %
O(2)	Overproduct of Plant Screen, Percentage of Feed	49.43%
O(3)	Recovery of Plus "W" Material, Percentage of Feed	45.48%
O(4)	Recovery of Plus "W" Material, Percentage Total Plus "W" (Item O(3) divided by Item O(1))	94.75%
T(1)	Minus "W" Material in Feed, Percentage of Feed	52.00%
T(2)	Through Product of Plant Screen, Percentage of Feed	50.57%
T(3)	Recovery of Minus "W" Material, Percentage of Feed	48.04%
T(4)	Recovery of Minus "W" Material, Percentage Total Minus "W" (Item T(3) divided by Item T(1))	92.37%

Plant Screen Data

Screen: Type ..; Net Surface .. × .., Size and Shape Perf. .. × ...
Feed: TPH Max. .. Avg. ..; Size .. × ..; Surge Bin .. Tons.
Moisture: In Through Product, Total ..%; Surface ..%.
Give size consists and other available data on back of sheet.

* W Test Sieve in a given case is that with openings of the size, at which it is desired to separate the feed.

WHEELS of Government

● *As Viewed by A. W. Dickinson of the American Mining Congress*

Washington Highlights

PRIORITIES: Preference ratings for mining equipment are emerging.

TUNGSTEN DUTY: Opposition heard to eliminating tariff on tungsten.

TAXES: New Tax Bill provisions still being considered.

ST. LAWRENCE SEAWAYS: Opponents register widespread and vigorous opposition.

LABOR SUPPLY: Shortages growing in skilled workers. Priorities on labor a possibility for the future.

OPACS: Emphasis shifts to allocation of civilian supplies.

PRICE-FIXING: Complete price-fixing measure reported awaiting approval from the top.

SIX months of the session for the current year are behind the Congress and the Administration. With the country in a quasi-war status, the Administration has on the whole maintained legislative control, tangible evidences of this being the passage of the Lend-Lease Act, extension of the President's powers over the stabilization fund and fixing the weight of the dollar, and the acquiescence of both House and Senate in ever mounting appropriations. It remains to be seen whether the strong stand taken by the Administration upon labor stoppages in defense industries will continue to exercise its effect. Strikes and arbitrary labor action have decreased, although national labor leaders have been vociferous in protesting the use of Federal troops to maintain order. Administration forces have been complacent while militant labor leaders are extremely active in both the House and Senate in eliminating labor control provisions from the War Department appropriation bill and also from the Selective Service age limitation measure.

Mines Must Have Equipment

Recognition by the defense agencies of the importance of mining was indicated in mid-June by the issuance of an A-3 preference rating to the builders of mine cars for underground and open-cut use. An additional OPM order will soon be issued granting preference ratings to builders of mine locomotives. These actions enable the manufacturers to secure the materials necessary to meet the major equipment needs for mine haulage. A further order now expected daily will give priority status for repair and maintenance materials and equipment required for uninterrupted operation of a number of industries, including mining and quarrying, coke converting, and metallurgical plants engaged in the production of raw materials. It is anticipated that this order will carry a preference rating of A-10 and that in the event of emergencies, where equipment is lost or damaged through slides, falls, floods, fire or other unforeseen happenings a rating of A-1-a may be had. The order states that the term "maintenance" means the upkeep of property and equipment, and that the term "repair" means the restoration of property and equipment to a sound state after wear and tear, damage, destruction of parts, or the like. It is further stated that these terms include replacement of parts which have been worn out, damaged or destroyed, but do not include replacement when the new part or parts represent a change-over in model, the introduction of superior types of equipment to replace usable equipment of an older or inferior type or design, or substitution more extensive than that which is necessary to replace the part or parts worn out, damaged, or destroyed.

Significant to mining also is the order and preference rating recently issued to the manufacturers of canning machinery, which was quite limited in its application but gives the rating of A-2. Coupled with the need for canning machinery in the minds of OPM officials is also a definite consciousness of the importance of new and replacement machinery and equipment to the mining industry; it is believed that the persistent efforts being made to secure a high preference rating for the manufacturers of mining machinery and supplies will soon bring forth additional relief.

In addition to the industry advisory committees which are being formed under the OPM, labor advisory committees are being set up under Associate Director Hillman. It is planned that these committees will consult with Government representatives in the various commodity sections of OPM, advising concerning those phases of defense production which are of primary concern to labor. As in NRA days, industry committees and labor committees may actually join in the conduct of defense discussion.

Another move which may become of great importance is the foundation of a labor supply branch of the OPM's Labor Division, under Civil Service Commissioner Arthur S. Flemming. Twelve regional labor supply committees, combining the same agencies with representatives of labor and management in industrial areas, are created to provide for the hiring and training of workers. This may readily be the beginning of a system of labor priorities and may eventually include the allocating of labor in civilian industries to defense production.

Tampering with Mineral Duties

The War Department secured the introduction in both Houses of a bill which would suspend import taxes or duties, internal revenue taxes or other charges of like character upon the importation or withdrawal of any article certified by a department or agency of the United States to be a defense article, when entered for consumption, or withdrawn from warehouse for consumption by or on behalf of such department or agency. The following definitions of defense articles were written into the bill:

(1) Any weapon, munition, aircraft, vessel, or boat.
(2) Any machinery, facility, tool, or supply necessary for the manufacture, production, processing, repair, servicing or operation of any article described in this section.
(3) Any component material or part of or equipment for articles described in this section.
(4) Any strategic or critical materials, purchased, produced, acquired, or carried pursuant to the Act of June 7, 1939 (U.S.C., 1934 Edition, Supp. V, Title 50, Secs. 98-98b), or Section 5d of the Reconstruction Finance Corporation Act, as amended.
(5) Any other commodity or article for defense.

In addition, the bill states that the term "department or agency of the United States" shall include, without limitation, any corporation all the capital stock of which is owned or controlled, directly or indirectly, by the United States. All laws which are inconsistent or in conflict with this Act are repealed to the extent of such inconsistency or conflict.

This bill has aroused much resentment on the part of Senators and Representatives from affected regions throughout the country. It is particularly dangerous to the mining and stock raising areas as it has no provision for termination, even at the end of the present emergency. Passage of the bill in its present form would be considered extremely discouraging to prospecting, exploration or development in mining and to managements, directors, stockholders or investors who are contemplating new ventures in a variety of enterprises.

The Committee for Reciprocity Information held hearings on June 23 and 24 on the proposed foreign trade agreement with the Republic of Argentina. Keenly aware of the harm being done by the inclusion of tungsten ore and concentrates among the commodities subject to negotiation for a reduction of duty under the proposed agreement, Senators, Representatives in Congress and tungsten producers appeared in person before the committee to make earnest protest and ask that tungsten ore and concentrates be stricken from the list. Senators Bunker of Nevada, Johnson of Colorado, Murdock of Utah and Thomas of Idaho appeared in person, as did also Representatives Murdock of Arizona, O'Connor of Montana, and White of Idaho. Charles H. Segerstrom, president of the American Tungsten Association, came to Washington from his home in Sonora, Calif., to tell the Committee for Reciprocity Information clearly and specifically the injury to a vital domestic defense industry by this State Department action.

Revenue Bill by August

As matters now stand the House is not expected to pass the 3.5 billion dollar Revenue Bill until mid-August and Senate leaders have said that it will be mid-September before the bill is ready for the President's approval. There is even talk at the present time of separating the excise features from the income and excess profits tax provisions, for quick approval of the excises in order to secure the much-needed revenue at the earliest possible date. If this should happen it is quite possible that revision of the income and excess profits tax section will be subjected to material changes in order still further to increase the revenue from these sources—and it is realized that such action will consume much additional time. There is also a battle pending over the requirement for a joint return of husband and wife, which is particularly distasteful to taxpayers of the mine community property states in the Southwest and West.

Labor Legislation Tangle

Pointed efforts in the Senate and House to curb labor stoppages in defense industries by legislative enactment met with defeat in June and early July. The House put amendments in the $10½ billion War Department appropriation bill which would have prohibited the use of funds under the measure to any person picketing a defense plant or who defied an order of the Mediation Board for as long as ten days. The Senate Appropriations Committee struck out the amendments when Undersecretary of War Patterson objected, stating that they would be extremely difficult to administer and would thus hamper defense expenditures. The Senate, however, passed the Selective Service Amendment Act with an amendment permitting the President to take over plants in which stoppages due to labor trouble are impeding defense work. When the House took the bill the amendments were revised and amplified, but, due to the determined opposition of national labor leaders, they were stricken out by two votes, of 219 to 152 and 220 to 149. The pressure exerted by labor organizations upon members of the House in connection with these votes was such as to arouse bitter comment on the part of many House members.

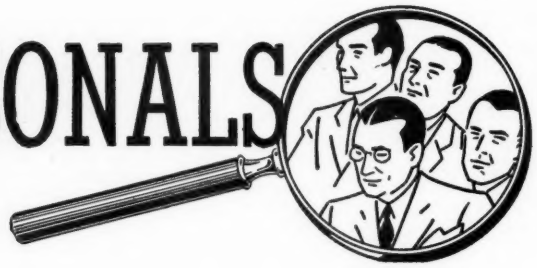
Record-Keeping Under Wage-Hour

Work has been proceeding on the revision of the wage-hour regulations concerning record-keeping by employers. In these revisions it is proposed that basic records be maintained which shall show specifically the total daily and weekly hours worked, total weekly straight-time earnings or wages, total weekly overtime excess compensation for each employee, and additions to or deductions from wages paid each workweek. As the result of representations made by the mining industry, which has always conducted its operations on a bi-monthly or monthly basis, it is now understood that the revised regulations will place the decision in the hands of the regional directors of the Wage-Hour Division. If the regional directors find that the necessary data are obtainable from the customary bi-monthly record kept by mining companies no change in present practices of record-keeping need be required.

There is a grotesque ruling in Interpretative Bulletin No. 3, as revised October, 1940, which provides that where

(*Continued on page 45*)

PERSONALS



Albert L. Brown has been appointed general manager of sales for the Consolidation Coal Company with headquarters in New York. Mr. Brown rejoins the Consolidation organization after an absence of eight years, during which time he was with Appalachian Coals, Inc., Cincinnati, Ohio. For the past three years he had been vice president and director of Appalachian Coals.

H. K. Kugel was elected president of the Smoke Prevention Association of America at the recent annual convention in Atlanta, Ga. He is chief engineer of the Division of Smoke Regulation and Boiler Inspection, Washington. **W. E. E. Koepler,** secretary of the Pocahontas Operators Association, Bluefield, W. Va., is first vice president of the association.

Robert Edgington has been elected vice president of United Collieries, Inc., Cincinnati, Ohio.

Arthur P. Cortelyou, assistant chief engineer for the Pacific Coast Division, the U. S. Vanadium Corporation, has been made manager of the offices recently opened by the company in San Francisco.

Thomas Moses, Pittsburgh, Pa., was elected president of the Mine Inspectors Institute of America, at the recent annual meeting in Bluefield, W. Va.

Dr. Luther A. Harr has been named by President Roosevelt, with the consent of the Senate, to the position of Bituminous Coal Consumers' Counsel, where he will represent the interest of the bituminous coal consuming public before the Bituminous Coal Division and the Interstate Commerce Commission. Dr. Harr will continue also in his present position as treasurer of the City of Philadelphia, until his term expires the last of this year.

John Kelly, of Hobbs, N. Mex., has been appointed state geologist of New Mexico by Governor Miles.

Dr. M. M. Leighton, chief, Illinois State Geological Survey, is serving on the Advisory Committee on Metals and Minerals, recently established by the OPM in Washington. Clyde Williams, director of Battelle Memorial Institute, Columbus, Ohio, is chairman of the committee.

Wiliam Scott, Columbus, Ohio, has been made traffic manager of the Lorado Coal Mining Company, which operates mines in Logan County, West Virginia.

Quinn Shaughnessy has been appointed price executive for the fuel section of the OPACS in Washington. He is on leave of absence from the Securities & Exchange Commission where he was assistant director of registration in charge of new financing.

Charles B. Henderson has been made chairman of the Reconstruction Finance Corporation, succeeding Emil Schram, who recently resigned to become president of the New York Stock Exchange. For the past seven years Mr. Henderson has been a director of the RFC, and in 1937 he was also made managing director of the Disaster Loan Corporation; since 1940 he has been head of the Metals Reserve Company, a subsidiary of the RFC engaged in accumulating stockpiles of strategic and critical materials essential to national defense. He was formerly a U. S. Senator from Nevada.

William L. Honnold, of Los Angeles, prominent alumnus of the Michigan College of Mining and Technology, has provided funds for furnishing a lounge room in Douglass Houghton Hall, men's residence building on the campus at Houghton, Mich. Dr. Honnold has had a distinguished mining and executive career in the United States, Alaska, Mexico, and is well known as having been ex-President Hoover's chief aide in Belgian relief during the last World War.

Walter Rothenhoefer, general manager of sales for the Koppers Coal Company has announced that the Chicago offices of the Koppers Coal Company, and the Bartlett Hayward and Wood Preserving Divisions of Koppers Company are consolidated into one office in the Railway Exchange Building, Chicago.

Glen Farnham is now mill superintendent at the Pride of the West operations at Howardsville, Colo., succeeding the late Arthur L. Saunders.

Patrick Green will be in charge of chrome mining in Cuba for the Harbison-Walker Refractories Co. For the past few years he has been mining engineer for the Northwest Magnesite Co., Chewelah, Wash.

James S. Earle has been appointed to the staff of the Conservation Section of the Office of Production Management, Washington. He was formerly assistant metallurgist of the Federated Metals Division of the A. S. & R. Company.

L. B. Mitchell, Jr., Joplin, Mo., has been appointed editor in chief of the Missouri Engineer, monthly publication of the Missouri Society of Professional Engineers, succeeding H. J. Bruegging, of Jefferson City. Mr. Mitchell was formerly associate editor of the publication.

L. E. Putnam is now manager of the Riverside mine in Alaska for the J. H. Scott Company, San Francisco. Before accepting his present position he was manager of the Atolia Mining Company, Randsburg, Calif.

Frank H. Gunnell, consulting geologist of Salt Lake City is now vice president and general manager of the Western Gold Exploration Company, operating the Valley Creek mines at Stanley, Idaho.

George F. Campbell has been unanimously chosen as president of the Illinois Coal Operators Association, succeeding the late Moses F. Peltier.

Ernest Kleptko is chief engineer of the plant now under construction at Boulder City, Nev., for the beneficiation of manganese ores and their electrolytic processing. He will supervise the plant.

William N. Fink, mining engineer of El Paso, Tex., and **F. G. Bacon,** metallurgist of Chihuahua, Mexico, are in Bolivia with **H. C. Dudley,** president of Dorado Mines Corporation, engaged in examination of gold and tungsten properties.

Charles W. Towne, for many years head of the Department of Information of the Anaconda Copper Mining Company, Butte, Mont., retired on June 1.

Bertrand A. Landry has joined the staff of Battelle Memorial Institute, Columbus, Ohio, where he is engaged in research and development work in the Division of Fuels Research. Prior to his association at Battelle, Mr. Landry was for 18 years with the U. S. Bureau of Mines, engaged in research on the principles of combustion, the distillation of oil shales, the theory of sampling and the chemical treatment of fuel.

J. R. Welch is associated with the Freeport Sulphur Company at Freeport, Tex. He recently returned from South America, where he was with the Chile Exploration Company, Chuquicamata, Chile.

W. P. Buffington has been made traffic manager of the Rochester & Pittsburgh Coal Company, with headquarters at Indiana, Pa. Formerly he was traffic manager for the Pittsburgh Coal Company.

Alan C. Dodson, president, Weston Dodson & Co., was recently elected vice president of the Independent Anthracite Operators Association, succeeding Byron W. Sleppy, resigned.

Frank Ayer, for many years general manager for Roan Antelope Copper Mines, Ltd., and Mufulira Copper Mines, Ltd., in Africa, and more recently consulting engineer for those companies, has been appointed chief of the conservation section of the Office of Production Management in Washington.

S. K. Droubay, chief engineer of Walker Mining Company, Walkermine, Calif., has been transferred by the parent company, International Smelting & Refining Company, to the property of Copper Canyon Mining Company at Battle Mountain, Nev., recently optioned by International. He will be in charge of development and operations at Battle Mountain. **J. J. Lillie**, general manager of Mountain City Consolidated Copper Company, at Rio Tinto, Nev., also controlled by International, has been appointed manager of the Copper Canyon project, in addition to his other duties.

A. B. Williams has been appointed manager of Moctezuma Copper Company, a subsidiary of Phelps Dodge Corporation, succeeding **H. H. Horton**, resigned.

Paul Gemmill has been appointed chief geologist for Prince Consolidated Mines and for Bristol Silver Mines at Pioche, Nev.

R. Emmett Howe, president of Appalachian Coals, Inc., recently appeared in Washington, D. C., as official representative of the Cincinnati Chamber of Commerce in opposition to the St. Lawrence Hydroelectric and Seaway Project.

Ralph Hayden has been named mill superintendent at Walkermine, Calif., succeeding **M. R. McKenzie**, recently retired.

Dr. M. F. Coolbaugh, president of the Colorado School of Mines at Golden; **J. F. Kleff**, of Leadville; and **Donald Latta**, of Cripple Creek, were reappointed by Governor Carr as members of the State Mineral Resources Board. **C. S. Withrow**, of Denver, was appointed to succeed Carroll Carter, of Iowa City, on the Board, and **F. D. Willoughby**, of Aspen, was appointed to succeed **W. H. Twining**, of Aspen.

O. H. Metzger, assistant mining engineer for the U. S. Bureau of Mines, has been transferred from Salt Lake City to Reno, Nev.

Laurence M. Ewell has been appointed general manager of eastern division operations for the Link-Belt Co., with headquarters in Philadelphia. He was formerly export manager and manager of the New York office of the company, in which position he will be succeeded by **Carl A. Woerwag.**

J. H. Buehler, for many years in charge of the Bristol Silver Mining Co., Pioche, Nev., for the Snyder Interests of Utah, has been made manager of mines for Snyder Mines, Inc., in charge of all the company's properties in Utah, Idaho, and Nevada. He will continue to reside at Pioche. **Henry S. Coleman**, formerly foreman for Combined Metals Reduction Co., at Pioche, has been promoted to the superintendency of the Bristol Silver Mines property filling the vacancy left by Mr. Buehler.

The United States Geological Survey is conducting extensive exploration and reconnaissance work in Alaska during the present open season. Various parties are at work as follows: **R. R. Coates** is directing an investigation of the tin-bearing area on the Seward Peninsula; **Russell G. Wayland** is head of a field party at work on the tin deposits of the Hot Springs district; **William T. Pecora**, assisted by **J. B. Lyons**, is conducting an investigation of nickel deposits in the vicinity of Mirror Harbor and adjacent parts of Chichagof Island; **P. W. Guild**, assisted by **James R. Balsley**, is directing a party investigating occurrences of chrome minerals at Red Bluff Bay on the east coast of Baranof Island; **Wallace M. Cady** and field party is making examinations of quicksilver occurrences in the vicinity of Sleitmut in the Kuskokwim Valley; **D. E. White** is in charge of a party examining antimony mineralization in the Kantishna district in the northern foothills of the Alaska Range in central Alaska; **J. C. Reed**, assisted by **G. O. Gates** and a field party, is carrying out surveys in southeastern Alaska in connection with the search for minerals of strategic importance and with general mineral investigations; **F. H. Moffit** is continuing and will probably complete, field surveys in the sector of the Alaska Range which lies between the international boundary on the east and the Delta River on the west; **J. B. Mertie, Jr.**, is conducting a geologic and mineral resource investigation of the section of the valley of the Porcupine River from the international boundary westward; **T. W. Ranta**, topographer, is in charge of a party mapping by ground methods the country west of Chulitna River, including the part of the eastern flank of the Alaska Range in which the Kahiltna River and its tributaries have their source. This area includes a number of placer camps, those on Cache and Peters Creeks being the best known; **Gerald FitzGerald** is supervising and directing a major topographic project involving the photographing from the air of parts of the Kuskokwim Valley and the compilation of cartographic data therefrom.

G. H. Hornickel, for 28 years general superintendent for the Anchor Coal Co., at Highcoal, W. Va., has retired. He will maintain a residence in Highcoal. **Van B. Stith**, formerly superintendent of mines, has been appointed general superintendent, succeeding Mr. Hornickel.

Paul F. Chamberlain, Duluth, Minn., assistant director of the Oliver Iron Mining Company, retired this spring. He has spent many years in the service of the company.

Clyde H. Wilson, formerly president of International Geophysics, Inc., Los Angeles, Calif., is serving as geophysicist in connection with a geophysical exploration project in the Tri-State district, now being carried on by the Kansas State Geological Survey and the University of Kansas Engineering Experiment Station, in cooperation with the Tri-State Zinc & Lead Ore Producers Association. **Dr. R. M. Dreyer**, economic geologist of the Kansas State Geological Survey, is in charge of one of the field parties already engaged in this work. **J. J. Jakosky**, dean of the Engineering School of the University of Kansas, and **Dr. R. C. Moore**, director of the State Geological Survey, are supervising the project, which is designed to develop geophysical techniques for ore exploration.

Harry J. Wolf, consulting mining engineer of New York, was recently appointed consultant on cadmium in the metals and minerals section of the Production Division of the OPM, Washington.

Victor Bougard is now chief engineer for the Reward Division of the Golden Queen Mining Co., Owenyo, Calif. He was formerly superintendent of the Cardinal Gold Mine.

H. Foster Bain, advisor on mines to the Philippine Government, Manila, returned to the United States in June for a two or three months' stay in Washington, D. C., on governmental business.

Ernest W. Ellis, formerly with the Engineering Equipment and Supply Company, Manila, P. I., is now located at Coco Mines, Ltd., San Carlos via Puerto Cabezes, Nicaragua.

Dale L. Pitt has been made president and general manager of Kensington Mines, Inc., Seattle, Wash.

Charles V. Averill, district mining engineer of the California State Division of Mines at Redding, has been promoted to the position of district engineer in Sacramento. **John Charles O'Brien**, of San Francisco, replaces Mr. Averill at Redding.

William W. Inglis, president of the Glen Alden Coal Company, was chairman of the recent joint conference between anthracite operators and labor representatives in New York City.

J. D. Harlan, vice president and consulting engineer for the U. S. Smelting, Refining & Mining Co., who has had his headquarters in Boston, has been appointed general manager of mines for the company, with headquarters in Salt Lake City. He succeeds the late E. A. Hamilton.

Charles F. Ball has been appointed director of engineering for the Joy Manufacturing Co., Franklin, Pa. Mr. Ball was formerly chief engineer of the Construction Division of the Chain Belt Company, Milwaukee.

Tasker L. Oddie, former U. S. Senator from Nevada, is conducting several mining operations in California, including the California Aztec Mining Co., near Kelsey, El Dorado County, Calif.

Ralph H. Moore was recently elected president of the Inyo-Mono Mining Association, Bishop, Calif.

Clarence A. Logan, district mining engineer in Sacramento for the California State Division of Mines, will survey and classify for mineral potentialities, 1,000,000 acres of state lands, principally in southern California. The Division of Mines has entered into a contract with the State Lands Commission for the purpose of conducting the survey.

J. J. Sellers, formerly vice president of the Virginia Iron, Coal & Coke Co., Roanoke, Va., has moved his office to Knoxville, Tenn., and will work for the Blue Diamond Coal Company of that city. The latter company has taken over, under a royalty and rental agreement, the mines formerly operated by the Virginia Iron, Coal & Coke Co.

James L. Lake has joined the staff of U. S. Vanadium Corporation at the Pine Creek tungsten mine near Bishop, Calif., in the capacity of metallurgist.

C. W. Haffey, Colfax, Calif., was recently elected president of the California Hydraulic Mining Association. At the same time, **Fred H. Harvey**, of Galt, was elected vice president; **W. W. Esterly**, Grass Valley, secretary; and **Mrs. Edna Davis**, Auburn, treasurer.

Earle C. Payne, consulting engineer, Consolidation Coal Company, and **J. C. R. Taylor**, engineer of coal development, the Virginian Railway, have been appointed members of the Technical Advisory Board of Bituminous Coal Research. Mr. Payne replaces on the Technical Executive Committee **R. L. Rowan**, who has resigned to assume active duty in the Navy.

R. B. Engdahl, until recently instructor in the mechanical engineering department of the University of Illinois; **Frederick W. Graves**, with the Youngstown Sheet & Tube Company; and **George W. Land**, formerly with the Illinois State Geological Survey, have recently joined the staff of Battelle Memorial Institute, where they are engaged in work for the fuels division.

William Beury, vice president of the Algoma Coal & Coke Company, Algoma, W. Va., has been named by the Pocahontas Mechanical and Electrical Institute as general chairman of the 1941 Southern Appalachian Industrial Exhibit, to be held in Bluefield, W. Va., in August.

Robert C. Craig has been made district manager for the Cleveland Rock Drill Company at the Salt Lake City office.

C. M. Maratta, maintenance engineer for the Timken Roller Bearing Company since 1921, has been appointed chief works engineer at Canton, Ohio, to fill the vacancy left through the death of W. C. Makley.

Leslie C. Mott, for five years secretary of the mining committee of the Los Angeles Chamber of Commerce, recently retired. The vacancy will be filled by **William J. Dunkerley**.

L. G. Martin, who has been in charge of the inventory control section, OPM, operating under General Metals Order No. 1, has been appointed head of the compliance section of OPM. He will continue also as chief of inventory control.

N. P. Rhinehart, chief, West Virginia Department of Mines, has been appointed by Governor Neely as a member of the Safety Commission which will draft a program for prevention of accidents on the highways, in industry, and in schools and homes.

E. B. Holt, who was district engineer for the Arizona State Department of Mineral Resources, until that department was abolished on June 15, has taken a lease on the War Eagle manganese properties, 27 miles northwest of Bouse, Ariz., where he will undertake development work.

F. V. MacArthur has resigned as secretary and assistant treasurer of the Link-Belt Company, Chicago, after nearly 50 years of service. Harry E. Kellogg has been elected secretary and also retains his former post of treasurer.

Wm. C. Thompson has been made superintendent at Mine No. 2, Pardee and Curtin Lumber Company, Barton Bergoo, W. Va., succeeding A. F. Phelps, who died recently.

—*Obituaries*—

Joseph William Cockill, president of the Edgemont Fuel Company at Minnie, Floyd County, Ky., died in the hospital at Huntington, W. Va., on May 20. At the time of his death he was 72 years old. He had long been engaged in mining work in the Big Sandy field.

George Herbert Jones, one of the founders and later president of the Inland Steel Company, died on July 6 in Chicago, Ill., at the age of 85. At the time of his death he was a director of the Inland Steel Company, and was also president of the Hillside Fluorspar Mines, Pershing Quicksilver Company and Mid-West Forging Company.

Born in England, Mr. Jones began his career in America in 1871 as a clerk for Hall, Kimbark & Co., Chicago iron merchants. In 1893, he was one of the organizers of the Inland Steel Company, later serving as president until 1921.

Mr. Jones had contributed generously to the University of Chicago and the Wesley Memorial Hospital, his gifts to the latter institution being approximately $3,000,000.

Lewis A. Rice, engineer and salesman for the Traylor Engineering & Mfg. Co., Allentown, Pa., died on June 4 at the Allentown Hospital. He was 71 years old. Mr. Rice had been with the Traylor Company for 30 years and was well known throughout the rock products industries in the eastern United States and in the gold mining districts of Ontario and Quebec

Adequacy of Certain Mineral Resources

(*Continued from page* 32)

tion of the minerals containing these associated metals precedes smelting. The silver is carried by the lead and removed in refining. Production generally adjusts itself to demand and has not fluctuated sharply with price changes. Prices went up only moderately through the World War. There have been higher quotations since.

Furnace capacity in the United States is about 2,500,000 tons of charge, generally concentrates, a year. We need not worry about reserves or capacity to produce for many years to come, though prices may have to be advanced considerably, as in the case of the other major metals, if the present tendency toward increased costs of production continues.

Aluminum

Aluminum has been made hitherto from the mineral bauxite, although experiments have been made on its production from alunite, a more complex mineral, also from certain aluminous clays. The principal bauxite mines are located in Arkansas, but other deposits are known in Alabama, Georgia and other states. Aluminum can be manufactured advantageously from bauxite imported from British Guiana and treated in this country on the Gulf Coast.

A threatened shortage of aluminum has been declared, but it is believed that this should be only temporary and could be corrected by stopping for a time the production of fabricated products for civilian uses.

Wheels of Government

(*Continued from page* 41)

overtime is paid to an employee no profits can be made on goods furnished to him by a company-owned commissary or store. This matter is now under discussion with Wage-Hour officials, and mining companies affected should communicate their views to the Division.

Pressure for the St. Lawrence Project

Since June 17 the hearings on the St. Lawrence Project have been grinding on, chiefly taken up by presentations of the proponents, consisting of many Administration officials, governors of two or three states and the mayors of several cities and towns. Opposition witnesses have been making the proponents of the seaway and power project uncomfortable, as evidenced by the fact that strong pressure is now being exerted to bring the hearings to a sudden end. This would well serve administration purposes by choking off testimony showing the lack of need for the project, either in its power or its navigation phases, and the harm which it would do to American industry, workers, transportation and agriculture. The position of the mining industry will be presented by the American Mining Congress, followed by testimony from organizations and producers of bituminous coal, anthracite and iron ore.

Metal Mining Convention

(*Continued from page* 35)

turers with large operating exhibits will present their products in a special display area in front of the Fairmont Hotel, where the street will be blocked off for the purpose. The hotel lobby, the main halls and other public rooms will be thrown open for exposition purposes and altogether the exhibit promises to be one of the most complete, instructive and colorful ever held in connection with the Metal Mining Convention.

Operating men now as never before need to study this display of all that is new and worth while, in order to acquaint themselves with the means whereby they can increase production to meet today's demand. Manufacturers' representatives will be on hand to help in figuring a solution for modern mining problems.

Plan to be in San Francisco for the convention—to discuss and consider the major problems of the industry, to see and learn about what is new and most useful to you in operating equipment and supplies, to visit with your friends and to have a good time.

Green Smokeless Sold

Announcement was recently made of the sale of the Green Smokeless Coal Co., with operations at Glady, in Randolph County, W. Va., to a company headed by Nat C. Burdett, of Morgantown. The mine has been operated by W. H. Green, of Elkins, W. Va., since 1932, but Mr. Green is now retiring after almost 50 years as an operator. Harry R. Hall, formerly of Monongah, will be vice president in charge of operations of the Glady Sewell Coal Co., which has acquired the property.

Flotation and Flour

(*Continued from page* 28)

The purpose of the dryer is to remove the small amount of moisture and any particles of hull which may still cling to the wheat kernel after it comes from the centrifugal machine. The dryer discharges a perfectly cleaned kernel of dry wheat grain to a stock bin over a grinding mill and the peeled wheat is ready for milling.

The baking company has announced that bread made from this flour can be marketed at no additional cost, over the customary price for white bread.

Health authorities assert the American people are undernourished. Dr. W. H. Sebrell, of the National Institute of Health, of the United States Public Health Service, speaking recently before a group of millers and bakers assembled in Chicago to discuss bread enrichment, said:

"It has been estimated that not less than one-third of our entire population are getting diets which are not entirely adequate. It may surprise some of you to learn that the average American diet is more deficient in thiamin, which is one of the vitamins of the B complex, than was the diet of 100 years ago."

Bread made from flour produced by the Earle process contains all the natural elements found in wheat, because they have not been taken out. Compared with ordinary white flour, this flour contains more minerals, more phosphorus, more iron, more proteins and more units of vitamin B_1 to the pound than the public now finds in its daily bread.

Mill Construction At Church Mine

The Madre de Oro Gold Mines, Inc., operating the Independent and Starlight mines in El Dorado County, Calif., are now constructing a mill of 200 tons capacity at the Church mine near El Dorado. The mill will have 20 stamps. A hydraulic-mechanical jig also will be used and two sets of flotation cells. Concentrates will be shipped to the Selby smelter. Forest Riley, of Corcoran, Calif., is president of the company, and William J. Loring, of El Dorado, is consulting engineer and general manager.

PETER F. LOFTUS
Consulting Engineers
ENGINEERING AND ECONOMIC SURVEYS, ANALYSES AND REPORTS ON POWER APPLICATIONS AND POWER COST PROBLEMS OF THE COAL MINING INDUSTRY
Oliver Building **Pittsburgh, Pa.**

NEWS and VIEWS

Outline of Priority Actions

Recently E. R. Stettinius, Jr., Director of Priorities, issued a summary of priority action which has been taken during the first half of 1941 in the interests of national defense, in part as follows:

I. Industry-Wide Control

The Priorities Division is administering orders which impose industry-wide mandatory control on, and regulate the distribution of, 14 materials and classes of materials. These are:

Aluminum.
Magnesium.
Nickel.
Nickel steel.
Ferrotungsten.
Tungsten high-speed steel.
Machine tools.
Synthetic rubber.
Copper.
Cork.
Borax.
Polyvinyl chloride.
Zinc.
Rubber.

All the orders pertaining to these materials are in the "M" series, except for the special order (E-1), regulating the distribution of machine tools. They are designed primarily to regulate and allocate the distribution of raw materials. The orders vary in detail, but the fundamental purpose is always the same—to put defense requirements uncompromisingly ahead of other needs.

II. Inventory Control

In addition to the materials under industry-wide mandatory control, the Priorities Division exercises a mild form of inventory control over 15 metals and classes of metals. These are:

Antimony.
Cadmium.
Chromium.
Cobalt.
Ferrous alloys, all types.
Iridium.

Iron and steel products, including rolled, drawn, forgings, castings and pig iron.

Lead.
Manganese or spiegeleisen.
Mercury.
Molybdenum.
Non-ferrous alloys, all types.
Tin.
Vanadium.

Secondary materials, or scrap, containing any of the metals listed herein or any metals already subject to an order of the Director of Priorities, prepared for sale in order to recover the metal content thereof.

This form of inventory control is provided in General Metals Order No. 1, which requires suppliers of these metals, in semi-processed or premanufactured form to file a statement of compliance once with the Priorities Division, and also requires customers for these metals in semi-processed or premanufactured form to file monthly statements of compliance with their suppliers.

These monthly statements declare that the customer has received no deliveries of any of the materials specified, during the previous calendar month, which increase his inventories of the quantities necessary, on the basis of his usual method and rate of operation, to meet his required deliveries efficiently.

These two forms of control, therefore—industry-wide mandatory control and inventory control—cover 29 materials and classes of materials.

III. Steel

Steel is in a special class. Iron and steel products are on the priorities critical list, subject to inventory control and also subject to the General Steel Preference Delivery Order No. 1.

The General Steel Preference Delivery Order is designed to assure the fulfillment of defense orders ahead of non-defense orders. It provides that a customer for iron and steel products who is unable to place an order satisfactorily, or who has his order unduly delayed, may bring this to the attention of the Priorities Division on a special form. The Priorities Division will then require the supplier involved to explain the delay or the rejection.

Upon the basis of information thus obtained, the O.P.M. will take whatever action is necessary to expedite the delivery of iron and steel products for defense or essential civilian purposes.

IV. Priorities Critical List

In addition to the 29 items controlled directly by the Priorities Division, the priorities critical list contains approximately 300 items and classes of items (most of them military in character but some of them raw materials) on which army and navy orders can automatically be given priority. The priorities critical list is maintained by the Priorities Division so that an authorized army or navy contracting officer, in awarding a contract for any of the items listed, may assign a preference rating to that contract if this is necessary in order to obtain the desired material in the necessary quantities and on the required delivery date. Although some of these 300 items are under industry-wide control, most of them are subject to control only in the sense that army and navy orders can automatically be granted priority.

V. Blanket Ratings

One of the instruments being used by the Priorities Division to speed defense work is the "limited blanket rating order." This order can be given to a company or companies engaged almost wholly in defense work. Such an order assigns a company one rating which applies to all its contracts or orders for specified scarce materials flowing into defense production.

So far, blanket ratings of this type have been given to (1) machine tool and gage builders, (2) crane builders, (3) certain producers of military airframes, engines and propellers, (4) producers of railroad freight cars, and (5) builders of merchant ships under the Maritime Commission program. Additional ratings of this type will be issued when necessary.

VI. Project Ratings

The priorities division also issues project ratings or "project letters" from time to time. Project ratings are somewhat similar to limited blanket ratings except that they apply to a project—such as a munitions plant, a power plant or a dam. So far the Priorities Division has issued over 65 project ratings.

VII. In addition to the various instruments already named, the Priorities Division can and does issue individual preferences rating certificates when necessary. These individual certificates can be issued to a manufacturer or businessman who has difficulty in obtaining supplies, whether or not his production is purely defense, if his work is important to defense.

Individual preference rating certificates, however, are in the majority of cases issued under the priorities critical list by army and navy contracting officers. Records of the Army and Navy Munitions Board indicate that about 266,000 certificates and extensions of certificates have been issued by the contracting officers of the armed services so far.

The Priorities Division itself has issued about 9,000 individual preference rating certificates.

VIII. Defense Supplies Rating Plan

The defense supplies rating plan has been developed to meet the prob-

lem of some defense manufacturers who, because they must start production in advance of receiving defense orders, must have aid to secure a steady flow of materials into their plants.

This plan provides for the granting of a preference rating (A-10) to manufacturers who can clearly identify the proportion of their production which is defense work. The A-10 rating applies only to the defense work.

Thus a manufacturer who is engaged 75 percent in defense work, can, if he meets all the requirements, get a preference rating which he may apply to deliveries of 75 percent of his required materials. So far, nearly 100 concerns have been granted the use of this plan.

Government Seeks Mineral Economists

Mineral resources are of the utmost importance to National Defense. In this connection the Government is looking for persons especially qualified in the economic aspects of the mineral industries to do professional research in the fields of minerals, coal, and petroleum. Civil Service examinations for these positions are now open. The salaries range from $2,600 to $5,600 a year. Applications will be rated as received at the Commission's Washington Office but interested persons are urged to file their applications at once.

Completion of a four-year college course with major study in such subjects as geology, metallurgy, mining engineering, economics, or political science, is required. However, persons who have had only two years of college study may substitute two years of experience dealing with economic aspects of the mineral industries. In addition, all applicants must have had progressive professional experience dealing with the economics of mineral industries. At least some of this experience must have been in research in either metallic minerals, non-metallic minerals, secondary metallic minerals, coal, petroleum, or general mineral economics. Graduate study in mineral economics or in a combination of mineral economics and general economics may be substituted, in varying degrees, for the experience required.

Mineral economists will plan or conduct professional research in mineral economics dealing with the conservation, utilization, extraction, refinement, marketing, consumption, and foreign and domestic sources, of minerals. This will include the evaluation and interpretation of basic data and the preparation of the results for use or publication, as the case might be. Applicants will not have to take a written test, but they are required to submit a list of whatever writings they have done in the field of mineral economics, and if possible, to submit a copy of at least one research project.

Further information, including the exact education, experience, and substitution provisions, is contained in the formal announcement. Announcements and applications forms may be obtained from any first- or second-class post office or from the Civil Service Commission, Washington, D. C.

Illinois Institute to Meet in October

The Illinois Mining Institute will hold its 48th annual meeting at the Hotel Abraham Lincoln, Springfield, Ill., on Friday, October 31. The program committee is working on an interesting program for the meeting, a complete announcement of which will be made at a later date.

M. M. Leighton, of Urbana, Ill., is president of the Institute, and B. E. Schonthal is secretary-treasurer.

Wage Hour Law and California Gold Mine

According to a notice recently sent to members of the Mother Lode Mining Association, California, by Walter D. Manning, Jackson, Calif., secretary of the association, the Wage and Hour Administrator in Washington has announced that he would enforce the act against California gold mines despite the decision of the United States Circuit Court of Appeals to the effect that gold mines which ship their concentrates to a smelter within the state, and ship their gold to the San Francisco Mint, and do practically all their buying within the state, are not engaged in interstate commerce. The notice is as follows:

"At an informal gathering of some of the directors of the Mother Lode Mining Association there was a discussion of the announcement by the Wage and Hours Administrator that he would enforce the act against California gold mines, in spite of the decision by the United States Circuit Court of Appeals to the effect that gold mining is not interstate commerce.

"The court stated that when the gold mines ship their gold to the Selby smelters or to the San Francisco Mint, and their concentrates to a smelter within the state, and do practically all their buying within the state, they are not engaged in interstate commerce.

"This situation was discussed by the directors present and it was the consensus of opinion that enforcement could not be invoked in view of the Federal court's decision in the Idaho Maryland Mines case.

"It was thought advisable that any operator from whom data regarding wages and hours and conditions of employment may be demanded should notify the Secretary, so that the matter can be discussed by the Association. Operators should at the same time consult their attorneys."

Berwind-White to Install Crushing And Cleaning Facilities

The Berwind-White Coal Mining Company, Windber, Pa., has contracted to install crushing facilities, conveying and elevating equipment at their No. 40 mine at Windber, for crushing lump coal to ¾", the plant to have a capacity of 235 tons per hour and to be completed by December 1, 1941. At the same time the company will install an addition to their present cleaning plant at the No. 40 mine, consisting of a 6 ft. air-flow cleaning unit, with a capacity of 50 tons per hour. Contract for the work has been let to the Roberts & Schaefer Co., Chicago.

St. Joseph Company Reopens Montana Mine

The St. Joseph Lead Co., New York, has reopened the Block P mine at Hughesville, in Barker district, Mont., a property which the company acquired in 1927.

The present one-compartment shaft will be enlarged to two compartments; a new steel ore bin also will be installed. Power has been made available for unwatering operations. Frank Skeels, manager of the California Division of the St. Joseph Lead Co., is in charge of the project.

Again . . . The One and Only Coal Washing Table Exhibited at the Coal Show

Improved "fanning out" action of the Diagonal Deck—the new record making Concenco Anti-Friction Head Motion—smooth and easy running—account for unsurpassed cleaning at surprisingly higher capacities.

Write for Bulletin No. 119

THE DEISTER CONCENTRATOR COMPANY

The Original Deister Co., Incorporated 1906

917 Glasgow Ave. Ft. Wayne, Ind., U. S. A.

West Virginia Mining Institute Meets

The West Virginia Coal Mining Institute held a summer meeting at Huntington, W. Va., on June 20 and 21, with W. G. Crichton, Charleston, W. Va., president of the Institute, presiding. A large and representative group of mining men attended.

On the first day the papers presented and the discussion which followed them were devoted to the problems of production and sales. Consensus of the discussion was that a close cooperation is necessary between these two divisions of the industry in order to achieve best results. Elmer Wierhake, Charleston, vice president of the Smokeless Fuel Company, emphasized the necessity of proper preparation of coal to insure customer satisfaction in his paper, "What the Sales Department Expects and Why;" J. Lindley, director of safety for the Koppers Coal Company, presented a paper on "Safety," emphasizing that the principles of safety must be impressed upon the foreman before the workmen at the face can be expected to develop an intelligent interest in the subject.

At the afternoon session, presided over by T. E. Johnson of Fairmont, W. Va., papers were presented as follows: "The Production Man's Viewpoint of Coal Selling," by Samuel Pursglove, Sr., vice president, Pursglove Coal Mining Company; "What Should the Production Department Do to Make Sales Effective?" by C. R. Mabley, Jr., assistant to the vice president, Island Creek Coal Sales Company; "Modernization of Bituminous Coal Industry," by H. B. Husband, division manager, Consolidation Coal Company.

A banquet was held in the evening at which the principal speaker was Dr. Charles E. Lawall, president of West Virginia University.

On the following day, Saturday, inspection trips were made to various points of interest in Huntington and vicinity, with golf and other amusements rounding out the day.

Blue Diamond Acquires Additional Mine

The Blue Diamond Coal Company has acquired by lease the property of the Virginia Iron, Coal & Coke Company, consisting of three mines located in the state of Virginia. These mines are the Imperial, producing from the No. 7 seam, the Monarch, producing from the Darby or No. 5 seam and the Tom's Creek mine, producing from the upper Banner seam. The Imperial and Monarch mines are located in Lee County, Va., and the Tom's Creek mine is located in Wise County, Va. The mines passed under the new management on July 1.

The coals were formerly marketed by the Vicco Fuel Corporation, a subsidiary of the Virginia Iron, Coal & Coke Company. In the future they will be sold by the Blue Diamond Coal Sales Company, a subsidiary of the Blue Diamond Coal Company.

Clean your coal the RS AND COMPANY way
For wet washing use
The IMPROVED LAUNDER-TYPE
HYDRO-SEPARATOR
write for BULLETIN No. 156
For fine coal washing
use HYDROTATOR
write for BULLETIN No. 157
For dry cleaning
fine coal 1¼" x 0"
STUMP AIR-FLOW CLEANER
write for BULLETIN No. 158
ROBERTS and SCHAEFER CO.
307 North Michigan Avenue, Chicago
P. O. Box 865 PITTSBURGH, PA
P. O. Box 570 HUNTINGTON, W. VA.

New Preparation Plant for National Mining

A complete coal preparation plant consisting of additions to the present tipple at the No. 3 mine, Muse, Washington County, Pa., will be installed by the National Mining Company, Pittsburgh, Pa. The plant is to be equipped with crushing facilities for run-of-mine and facilities for screening and washing 6" x ⅜" coal, the plant to be complete for making five sizes of prepared coal. Plant capacities will be 500 tons per hour and contract with the Roberts & Schaefer Company calls for completion by February 1, 1942.

Lake Superior Safety Council Holds Conference

The Lake Superior Section of the National Safety Council held the eighteenth annual conference in Duluth on June 26 and 27, with an attendance of 400. The annual banquet was held on the evening of June 26, addressed by Ralph L. Lee, of the Department of Public Relations of the General Motors Corporation.

Several papers were presented relating to various phases of safety. James Foggo, of Chicago, presented a paper entitled "Hazards of Pressure Vessels." Some of the other papers were: "Methods of Bringing Safety to the New Man in Iron Mining Industry," by Earl M. Holmes, assistant mining captain of the Leonidas mine, Oliver Iron Mining Co.; "Safety at Beneficiation Plants," by G. R. Whittington, safety inspector for the Cleveland-Cliffs Iron Co.; "General Open Pit Hazards," by Stanley A. Mahon, superintendent of the Mesabi Chief iron mine of the M. A. Hanna Co.; "Drilling and Blasting Practices," by Stanley A. Trengove, assistant superintendent of the Hibbing-Chisholm District for the Oliver Iron Mining Co., and Hayden M. Pickering, pit foreman at the Oliver Company's Hull-Rust iron mine. Other phases of safety practice were covered in additional papers.

Mining and Metallurgical Plants Get Priority Status

Mining and quarrying, coke converting, and metallurgical plants engaged in the production of raw materials on July 1 were given priority status by OPM for the materials and equipment required to maintain existing facilities in satisfactory operating conditions.

This action follows numerous conferences between the American Mining Congress and defense officials.

Under the order, these enterprises will be allocated materials and equipment prior to all other civilian requirements and prior to defense requirements to the extent consistent with the defense program as determined by OPM.

Sunshine Mine Tests Legal Rights

The famous Sunshine mine case, involving the question whether or not the mining company is engaged in interstate commerce and therefore subject to the provisions of the Fair Labor Standards Act, is being tried before the Federal Court at Coeur d'Alene, Idaho, with Judge C. C. Cavanah presiding. The action is a test case and has no connection with previous Sunshine litigation.

The Sunshine company contends:

1. That it and its employes are not engaged in commerce or in the production of goods for commerce, within the meaning of the Fair Labor Standards Act (Wage and Hours Law).

2. That if they are included within the meaning of the F. L. S. A., the application of such act is beyond the power of Congress to regulate interstate commerce and deprives plaintiff of its property without due process of law . . . and is therefore unconstitutional.

3. That the defendants be restrained from instituting any action arising out of claimed violation of F. L. S. A.

4. That if the court determines the plaintiff is subject to the operation of the F. L. S. A., "that only hours actually spent by an employe working at and around the usual place of work constitute hours of employment to be computed in determining when an employe has been employed (for a work week longer than 40 hours . . ." and that all time spent in traveling to and from the usual working place, and all time allowed for meals, is not to be considered as a part of such 40-hour work week; and also "that overtime must be paid for at a rate of not less than one and one-half times the statutory minimum of 30 cents an hour."

It is claimed by the Sunshine that its basic rate, $1 an hour, is higher than any competing mine in the United States; that many of such mines pay as low as 60 cents an hour for the same work for which it pays $1, and that under such an interpretation the Sunshine would be forced to pay $1.50 an hour minimum for overtime compared to 90 cents for many other mines.

Sunshine contends that the correct interpretation of the Fair Labor Standards Act is that it is merely a minimum wage law and that the minimum overtime rate in all cases is one and one-half times the statutory minimum of 30 cents an hour, or 45 cents an hour.

It is further claimed by Sunshine that its sole business "is the extracting of ore containing various complex metallic minerals" and the "concentrating of such ore in a mill," and it does not engage therefore in interstate commerce.

E. H. Casterlin, assistant U. S. district attorney, is representing the Government as one defendant.

R. D. Leisk, manager for the Sunshine company, testified relative to the interpretation of the Fair Labor Standards Act as it applies to mining. Mr. Leisk's testimony had to do with the working operations of the Sunshine.

He said that cost of production in the Sunshine had increased 10 percent in 1940, which he said was due to reduction of working time and a shorter working week. The problem, he said, is "when under the Fair Labor Standards Act must a company commence paying time and a half?"

Asked if it would be profitable to increase the number of men employed Leisk answered in the negative.

A limited number of men can work in a certain place in the mine at one time, he said. "It would be possible to increase operations in the mine by putting men on half time" and thus operating continuously, but he said it would not be practical because the income of the workman would be so reduced that it would be impossible to keep him.

Staggering the shifts in order to conform to the 40-hour week is too complicated to consider, Leisk said. Men would be changed for location of operation so frequently it would result in inefficiency. Each place in the mine, he said, has its own peculiarities and best results are obtained by letting the same crew which has become familiar with the characteristics of the tunnel work them, he said.

The hearing, involved in a bulk of detail, is in regard to a suit filed by the Sunshine mine against John Carver, U. S. district attorney, and affiliates of the C. I. O. and A. F. of L. unions. The counsel for the mining company is asking the court to give a declaratory statement on how a mine should operate under the terms of the Fair Labor Standards Act.

Free Clinics For Mine Employes Children

More than 3,000 children from the families of mine employes of The Koppers Coal Company are expected to receive physical examinations at the 18 free clinics which will be conducted this summer by the coal company's 25 doctors and 16 nurses, Thomas E. Lightfoot, director of welfare for the company, has announced.

Children of Koppers employes who are of pre-school age—from six months to six years—will be given these free examinations if brought to the clinics by their parents.

The 1941 series of clinics was inaugurated at Weeksbury, Ky., on April 24. Locations and dates for clinics in West Virginia and Pennsylvania are:

Maitland and Carswell, May 7; Kopperston, May 14; Powellton, May 22; Gallagher, May 29; Beards Fork, June 4; Kimberly, June 12; Smithers, June 19; Wharton, June 25; Keystone, July 2; Stotesbury, July 10; Helen, July 17; Glen White, July 24; Stanaford and Long Branch, July 31; Grant Town, August 6; Everettville, August 8; Melcroft, week of August 11; and Sonman, week of August 18.

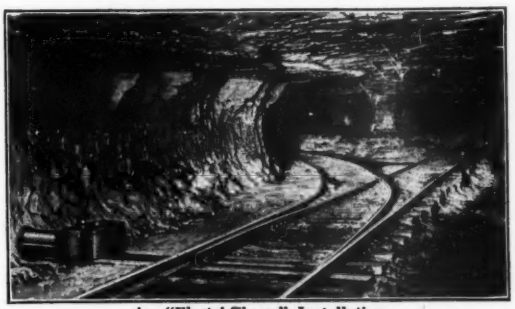
Seventeen clinics were conducted by the doctors and nurses in 1940, 2,214 children were examined and 69 percent of the physical defects which were discovered were corrected by medical care or surgical treatment.

REDUCE HAULAGE ACCIDENTS

by installing

AUTOMATIC SAFETY EQUIPMENT

Which makes manual labor on the haulway unnecessary



An "Electri-Throw" Installation

Switch points can be thrown by motorman without reducing speed of trip.

Signals can be flashed with trip at full speed to secure "right of way" and warn against collision.

Automatic Doors on the haulway open and close with the least possible interference with the ventilation.

Write for Bulletins, D-S and Si, giving details on this Safety and Self-liquidating equipment.

THE AMERICAN MINE DOOR CO.

2063 Dueber Ave. Canton, Ohio

Steel Plant Expansion

Requirements of national defense have brought about a vastly expanded steel industry, with other plants and proposals in prospect for a further enlargement. Expansion so far has been principally in the eastern part of the country, but tremendous new facilities are now planned or proposed for the western states. The plants when completed will produce primarily for defense needs, but these proposed facilities will have a tremendous direct and indirect effect upon the mining industry of the west.

In Seattle, the Bethlehem Steel Corporation now has four open-hearth furnaces, and an ingot capacity of 140,000 tons. An expansion is proposed to cost $1,100,000 and will include another open-hearth furnace, a reheating furnace and more storage facilities. The Northwest Rolling Mills, Inc., at Seattle has one electric furnace and an ingot capacity of 15,000 tons now. A 20,000-ton expansion of capacity is proposed.

The Columbia Steel Company has six open hearths and one electric furnace at Pittsburg, Calif., with an ingot capacity of 259,000 tons. An expansion is planned to cost $4,250,000, and to include added open-hearth furnaces, a blooming mill, billet mill and merchant mill. At South San Francisco, Bethlehem Steel Corporation has four open-hearth furnaces and an ingot capacity of 155,000 tons. The company proposes to spend $900,000 for an additional open-hearth furnace, a reheating furnace and other facilities. The Pacific States Steel Company has an electric furnace at Niles, Calif., and an ingot capacity of 35,000 tons. An expansion program is now under way to add a capacity of 115,000 tons, and a further addition is planned to increase capacity for alloy ingots and heavy forgings by 100,000 tons.

At Los Angeles, the Bethlehem Steel Corporation has three open-hearth furnaces, and an ingot capacity of 85,000 tons. The proposed expansion to cost $10,000,000, includes more open-hearth furnaces, electric furnace soaking pits, a blooming mill, billet mill, combination bar and structural mill and alloy finishing facilities. At Torrance, Calif., the Columbia Steel Company has four open-hearths and one electric furnace, and an ingot capacity of 182,500 tons. Additional open-hearth furnace and rolling mill capacity is proposed at an estimated cost of $1,750,000.

In Utah, at Provo, Columbia Steel Company operates a blast furnace and has an annual capacity of 172,000 tons of basic and foundry pig iron, and also has 56 by-product coke ovens. A tremendous expansion program is proposed to cost over $57,000,000, including additional coke ovens, blast furnace, open-hearth plant, bloom and slab mill, sheet bar mill, jobbing and sheet mill, plate mills, and a steel foundry.

At Pueblo, Colo., the Colorado Fuel & Iron Company has three blast furnaces and 16 open-hearths, with a capacity of 563,000 tons of basic foundry pig iron, and 880,000 tons of rolled products annually. An expansion is proposed to cost $15,000,000, adding 250,000 tons of ingot capacity with more coke ovens, blast furnaces, open-hearth furnaces, and finishing facilities.

Ground was broken in May by the Sheffield Steel Corporation of Texas for the erection of a $17,000,000 steel mill on the ship channel at Houston. The mill will have a production of 200,000 tons per year and the plant is expected to be in operation shortly after the first of next year. The mill is an expansion of the company's present production facilities at Kansas City, St. Louis, and Tulsa. Three open-hearth furnaces, billet mills and finishing departments will be utilized in the initial field production, and the finishing departments will include a structural and tie plate mill, merchant bar mill, reinforcing and rod mills, wire plant, and hot rolled sheet and plate mills. The Kansas City plant of the Sheffield Corporation also has announced expansion plans totaling $1,000,000, in addition to the recent $3,000,000 development, and will provide a fifth open-hearth furnace and increase steel production at that point by 25 percent.

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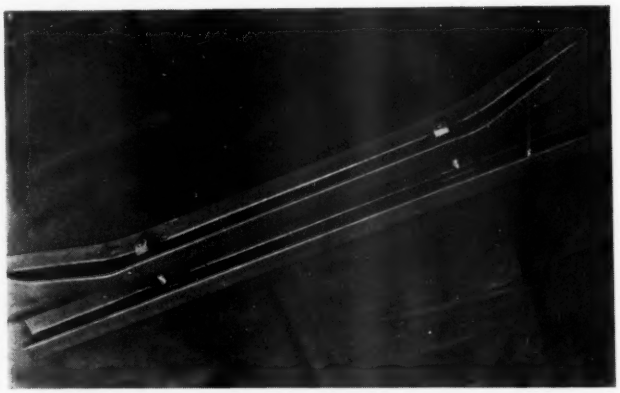
PRESENTED herewith are descriptions of prize-winning devices displayed in the Miners Exhibit at the Cincinnati Convention. Description of others were published in the June JOURNAL.

Guard Rail for Entry and Room Track

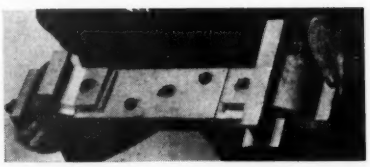
Submitted by
W. G. GUINEY
Bell & Zoller Coal & Mining Co.

The purpose of this device is to provide an effective guard rail that can be installed where needed in panel entries and rooms, and is especially designed to allow passage of caterpillar treads on mobile machines. As shown in the photograph, this rail is entirely self-contained, with the spacer blocks welded to prevent loss of parts. The rail is bolted to the track with large square head bolts that permit the use of a standard track wrench.



Sectional Steel Mine Tie

Submitted by
JAMES C. PURDON
ARTHUR J. DUKES
Stonebridge Coal Co.



This tie is constructed in two pieces for convenience of installation and removal without the use of spikes. The end clips which hold the rail in place are made large enough so that angles or splice bars are not needed at the rail joints. Cross bonding is eliminated since the ties themselves serve as bonds. The light weight of the tie—about 45 pounds—and the small amount of time and labor required for its installation, make it economical to use, and it can be built for any gauge track and any weight rail.

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Priorities Compliance Section Created

E. R. Stettinius, Jr., Director of Priorities, announced the creation of a Compliance Section within the Priorities Division. The new Compliance Section will investigate and take appropriate action in cases involving non-compliance or violation of priority orders.

Efforts will be made to obtain voluntary compliance in all cases, but punitive action can and will be taken if necessary, so that the great majority of producers, who cooperate freely and willingly, will not be penalized by the unfair activities of a few who refuse to cooperate.

In the event that efforts to obtain voluntary cooperation fail, action which may be taken includes:

1. Public statements as to violations or evasions which have taken place.

2. The restriction of supplies of critical materials until compliance is assured.

3. Court action to require compliance.

The Compliance Section will control and supervise compliance cases arising through complaints from within O.P.M., from within the armed services, and from industry and the public.

Within the Washington office of the Priorities Division, all complaints of non-compliance with orders or certificates will be referred to the Compliance Section and will thereafter be handled under its supervision. Provision will be made for consultation and advice with industry groups and committees.

Complaints arising in the field will be handled as far as possible by field representatives, who will follow established compliance methods.

It will be the responsibility of the Compliance Section to see that industry is well informed on compliance matters and to promote not only understanding but a willingness to comply.

Coal Wage Negotiations Settled

After almost four months of negotiation a wage agreement was signed on July 6 between the Southern Appalachian coal operators and the United Mine Workers. The agreement was reached less than 48 hours before a scheduled cessation of production by the miners in the territory covered by the agreement, southern West Virginia, Virginia, eastern Kentucky and Tennessee.

This contract is essentially the same as that signed on June 19 by the northern mine operators, and provides for a $7.00 basic daily wage, thus eliminating a 40-cent-a-day wage differential previously enjoyed by the southerners in a contract which expired April 1. Under the old contract the southern operators paid $5.60 per day and the northern operators $6.00 per day, base rate. The agreement also increases by 11 cents a ton the pay for hand-loading of coal, making the scale range from 81½ cents a ton in Kentucky's Big Sandy-Elkhorn field to 68.2 cents in West Virginia's Logan mines.

Rocky Mountain Institute Meets in Denver

On June 26 to 28, inclusive, the 39th meeting of the Rocky Mountain Coal Mining Institute was held in Denver. Conditions in the bituminous coal industry were discussed, as were also modern operating and mechanical methods, the latest cleaning methods, and talks on allied industries such as the steel industry; as well as papers on safety and safety training.

The meeting was keynoted by C. M. Shott, general superintendent, Sheridan-Wyoming Coal Company, Monarch, Wyo., in his opening address. The program also included a number of sound motion pictures, depicting various phases of mining and allied activities. D. H. Pape, president, Sheridan-Wyoming Coal Company, discussed "The Coal Situation," and John E. Willson, resident engineer, and Frank P. Lobar, Union Pacific Coal Company, presented a paper "Development With and Against the Pitch at the Union Pacific Coal Company's Mines at Reliance and Winton, Wyo." Other interesting and instructive papers were read.

The usual well-attended annual banquet was held on the evening of June 26.

Employes Representation on Coal Producers' Boards

The Bituminous Coal Division of the Department of the Interior has issued an order designating a member to represent mine employes on each of the 22 bituminous coal producers' boards.

The Division's order stated that it had called upon the United Mine Workers of America and the Progressive Mine Workers of America to select the employe representatives, each union being asked to make the selection in the district in which its members represented the preponderant number of employes in the industry.

The Division found that the United Mine Workers represented the preponderant number of mine workers in each district, and designated the persons selected by that union as the new employe members of the boards. Following is the member designated for each district:

District 1—Eastern Pennsylvania: James Mark, Miners' Building, Clearfield, Pa.

District 2—Western Pennsylvania: P. T. Fagan, 1208 Commonwealth Building, Pittsburgh, Pa.

District 3—Northern West Virginia: C. F. Davis, Commercial Building, Fairmont, W. Va.

District 4—Ohio: John Owens, 85 East Gay Street, Columbus, Ohio.

District 5—Michigan: John Hatton, 1527 Marquette Street, Saginaw, Mich.

District 6—Panhandle West Virginia: George W. Savage, 85 East Gay Street, R. 1006, Columbus, Ohio.

District 7—Southern West Virginia and Virginia "Smokeless": William Blizzard, Box 1332, Charleston, W. Va.

District 8—Southern West Virginia, Eastern Kentucky, Western Virginia, and part of Tennessee: Samuel Caddy, 1408 First National Bank Building, Lexington, Ky.

District 9—West Kentucky: Edward J. Morgan, Madisonville, Ky.

District 10—Illinois: Ray Edmundson, United Mine Workers' Building, Springfield, Ill.

District 11—Indiana: Louis Austin, Indiana Theater Building, 679 Ohio Street, Terre Haute, Ind.

District 12—Iowa: Louis Boldrini, United Mine Workers' Building, Albia, Iowa.

District 13 — Alabama: William Mitch, 517 Comer Building, Birmingham, Ala.

District 14—Arkansas - Oklahoma: David Fowler, 414 Metropolitan Building, Muskogee, Okla.

District 15—Missouri-Kansas-Oklahoma: Henry Allai, United Mine Workers' Building, Pittsburg, Kans.

District 16 — Northern Colorado: O. F. Nigro, Box 1466, Denver, Colo.

District 17 — Southern Colorado: Frank Hefferly, 315 Security Building, Denver, Colo.

District 18 — New Mexico: Eben Jones, 736 South Fifth Street, Raton, N. Mex.

District 19—Wyoming: James Morgan, 3210 Dillon Avenue, Cheyenne, Wyo.

District 20—Utah: Alfred Carey, 817 Center Street, Rock Springs, Wyo.

District 22—Montana: W. A. Boyle, Box 1257, Billings, Mont.

District 23 — Washington: Richard Francis, 1518 Smith Tower, Seattle, Wash.

The district boards represent the coal industry in cooperation with the Division in administration of the Bituminous Coal Act under which minimum prices and marketing regulations have been established to stabilize the marketing of bituminous coal.

Scrap Iron and Steel Needed

Officials of the Office of Production Management have advised that a serious shortage impends in the coming months in the supply of scrap iron and steel required by foundries and steel furnaces. In order that requirements for pig iron and steel may be met, strenuous efforts are being made to locate and make available every kind of iron and steel scrap. The OPM has requested that the American Mining Congress advise all possible members of the mining industry that their cooperation in meeting this need is desired. Reports indicate that very substantial quantities of steel and iron scrap are available at many mines, particularly in the coal mining areas. It is urgently requested that all mining companies scrutinize carefully their plants and yards for available scrap and deliver it as soon as possible to steel plants, foundries or established scrap dealers.

Vanadium Mill to be Built

To meet increased demand, the United States Vanadium Corporation is reported to have decided to build a mill for the production of vanadium near Rifle, Colo. J. R. Munro, in charge of company operations in Grand Junction, Colo., recently said work on the new Rifle plant would begin at once and would be completed as soon as possible; it is hoped to have the Rifle plant in operation in the fall. The corporation operates a mill at Uravan, Colo., producing about 75 percent of the nation's vanadium oxide output. This mill had been moved from Rifle about five years ago to be near higher grade and more extensive deposits. The new mill will enable the company to increase materially its vanadium output.

Coal Company Builds Recreation Camp

The 76-acre summer recreation camp for children of mine employes of the Koppers Coal Co., on a site along the inner curve of the famous Big Bend of the Greenbrier River, 10 miles east of Hinton, W. Va., is now in use.

Eleven camp cottages, a dining hall, an infirmary, an office cottage and a cottage for domestic help were prepared for the initial group of youngsters who arrived on June 28 for the first of four two-week camping periods of the 1941 summer season.

The project has been named Camp Thomas E. Lightfoot, in honor of the coal company's director of welfare, who is responsible for its creation. It is owned by Koppers Recreation Camps, Inc., chartered by the State of West Virginia as a nonprofit organization.

The site of the camp buildings is on a plateau 90 ft. above the low-water level of the river. There is an 1,800-ft. frontage of wooded slope on the river with two large swimming beaches.

An 82-ft. well, drilled through solid rock, will deliver 27 gals. of filtered water a minute. This well is piped throughout the camp for fire hydrants and drinking fountains. A 15,000-gal. concrete reservoir holds water reserves for cooking and for showers, washrooms and toilets in the basement of the main building.

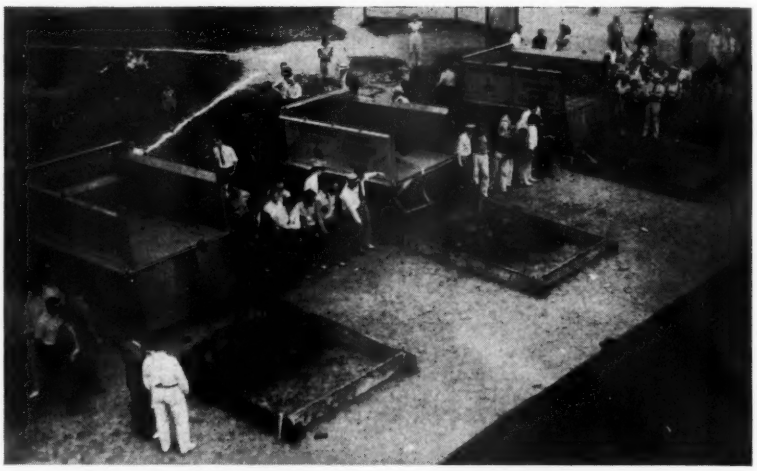
With a capacity of 150 for each two-week period, it is expected that 600 youngsters between the ages of 8 and 15 will use the camp during July and August. The youngsters pay a small fee, and the bulk of the cost of operating the camp is paid by the company. The campers come from the following 21 communities near Koppers mines in West Virginia, Pennsylvania, and Kentucky:

West Virginia—Beards Fork, Carswell, Elkridge, Everettsville, Gallagher, Gamoca, Glen White, Grant Town, Helen, Keystone, Kimberly, Kopperston, Long Branch, Maitland, Powellton, Stanaford, Stotesbury, Wharton.

Pennsylvania—Melcroft, Sonman.

Kentucky—Weeksbury.

COAL LOADING CONTEST—



At the 5th annual picnic of the Pittsburgh Coal Company employes, held at Kennywood Park, Pittsburgh, on June 21, a feature of the day's events was the selection of a "Champion Miner." Included in the contests leading to the selection of champion, was one of speed in loading a ton of lump coal from the ground into a truck. This contest is shown above. John Kulek, Jr., of the company's Crescent mine, was the fastest loader, completing the task in three minutes and 40 seconds. All factors considered, Patsy Siciliano of Montour No. 10 mine was voted champion miner; Peter Sherman of Banning No. 1 mine was second and John Kashura of Euclid mine, third

Mining Company Gives Vacations-With-Pay

Bunker Hill & Sullivan Mining & Concentrating Co., at Kellogg, Idaho, operating the largest mining enterprise in the Coeur d'Alene District, has decided on a new program affecting employes' vacation periods. The company announces that a new plan has been adopted by the company and ratified by representatives of the employes whereby employes who have worked for the company more than one year will be granted a five-day vacation period, with full pay each year, the new plan to become effective in 1942.

J. B. Haffner, general manager for the company, stated that the plan will affect about 1,200 men. He said an extra day would be added to the five-day vacations for each year of service in excess of five years. Under this plan an employe with 25 years' service would have a 25-day vacation on full pay. There are reported to be a large number of employes now on the Bunker Hill pay roll who have worked for the company more than 25 years.

Aluminum Conserved by Manufacturers

Enough aluminum to build 130 two-engine Army bombing planes has been released by use of plastics, steel, and other substitute materials in the Westinghouse Merchandising Division at Mansfield, Ohio, according to a recent statement by the company.

More than one and one-half million pounds of aluminum has been withdrawn from 1941 requirements for electric refrigerators, ranges, and other appliances. Other vital defense materials conserved by use of alternate materials include more than 150,000 lbs. of nickel and approximately 100,000 lbs. of zinc.

Many of the substitutes proved to be better than the originals, according to the statement. In a search for one thing, engineers often have found an improved material or device that they were not trying to find. Under the drive of necessity, they have been stimulated to better and more efficient work, and are turning out products even better than before, from the standpoint of durability as well as performance.

Sunshine to Develop Manganese Property

Sunshine Mining Company is reported to be starting work on the development of a manganese property which the company acquired several months ago in the Fairholme district of the Olympic peninsula and near Mount Mueller at the west end of Crescent lake, near Port Angeles, Wash.

Gay Mining Company Organized

Harry S. Gay and associates have organized a company to be known as the Gay Mining Co., of Mount Gay, Logan County, W. Va., with a view to operating in the Stafford district of Mingo County, W. Va. The new company is capitalized at $100,000. Included in the incorporators are Harry S. Gay, Vera Davis Gay, and F. Paul Chambers.

BOOK REVIEWS

MACQUOWN'S DIRECTORY AND HANDBOOK OF ANTHRACITE. *Sixth edition compiled and published by the National Coal Publications, Law Bulletin Building, Pittsburgh, Pa. 60 pp. Price, $7.50 per copy.*

This is the 1941 edition of the well-known "Mac's" Anthracite Directory, published annually. Contained in its pages are sections as follows: (1) "The Anthracite Industry," by Louis C. Madeira, III, executive director of the Anthracite Institute, who discusses the present status and problems of the anthracite industry; (2) "Commercial Application of Anthracite," by Hobart L. Littell, combustion engineer of the Anthracite Institute, who discusses the present success and means being employed to increase the use of anthracite in industry; (3) "Anthracite Trade Names," a section alphabetically arranged showing ownership and other available details of a large percentage of the leading trade marks used in the merchandising of anthracite; and (4) "Anthracite Industry's Promotion Aids Retail Dealers," a one page discussion by Frank W. Earnest, Jr., president, Anthracite Industries, Inc., of the research and promotion being employed to enlarge the market for anthracite.

The major part of the book, Section 5, is an Anthracite Directory, composed of the following parts: (a) Anthracite selling companies, arranged by location of sales offices, alphabetically by states or provinces and cities, listing both main and branch offices showing street address, phone number and name of executive in charge of sales; (b) Anthracite selling companies, alphabetically arranged, showing location of main and branch selling offices with sales managers—name and location of representatives—source of supply, giving colliery, operator and location (field, region and county) and trade names; (c) Anthracite producing companies, alphabetically arranged showing executives and mining officials with their addresses and data for each colliery—map number, location (field, region and county), shipping point, railroad, seams mined, thickness of seams, preparation equipment and other data; (d) Anthracite producing companies, alphabetically arranged by field, showing name of company, name of colliery or mine and region and county in which located; (e) Anthracite collieries and mines, alphabetically arranged showing name of producing company; (f) Map of anthracite fields, showing regions and counties, and location of each colliery, mine and railroad; (g) Numerical listing of collieries and mines.

The remainder of the book is devoted to sections on Anthracite Operators Association, Anthracite Industries Laboratory, Automatic Anthracite Controls, List of all Automatic Equipment Approved by Anthracite Industries Laboratory, with name and address of manufacturer, Standard Anthracite Sizing Specification and interesting anthracite statistics.

MINING ENGINEER'S HANDBOOK. *Third edition, two volumes, published 1941 by John Wiley & Sons, Inc., 440 Fifth Avenue, New York. List price, $15 net.*

This third edition of the Mining Engineer's Handbook is written by a staff of 46 specialists, under the editorship of Robert Peele, Professor Emeritus of mining engineering in the School of Mines, Columbia University, with the collaboration of John A. Church, mining and metallurgical engineer.

Peele's Mining Engineer's Handbook is too well known to need elaborate comment. First published in 1918, it was revised and enlarged in 1927 in a second edition. This third edition contains the revisions and additions necessitated by the advances in the interval of 14 years since the previous edition. A radical revision has been made in the text and illustrations of Sections 3, 4, 5, 8, 10, 10a, 12, 14, 15, 16, 22, 24, 26, 27, 32, 33, 35 and 40, together with minor changes in many other parts of the book. Included in these revisions is important new matter in Section 10, on further changes in methods of mining by James F. McClelland, vice president of Phelps Dodge Corporation; also a valuable new Section 44 on "Petroleum Production," by S. F. Shaw; the marked advance of "Geophysical Prospecting" during the past decade has made advisable the addition of an entirely new section, 10a, on that subject, by Frederick W. Lee, of the U. S. Geological Survey. Radical revision and enlargements have been made in many other sections of the book.

The volumes have been reset in a larger format. This is one of the most authoritative reference books for mining engineers all over the world, and this new and modern edition fills a real need for accurate and up-to-date information on practice in the entire engineering field as well as in the specialized branches of mining, milling and metallurgy.

EXPLORATION GEOPHYSICS, *by J. J. Jakosky, Sc.D., Dean, School of Engineering and Architecture, and director, Engineering Experiment Station, University of Kansas, Lawrence. Issued by the Times-Mirror Press, Los Angeles, Calif.; first edition.*

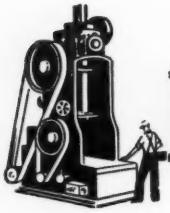
This volume, consisting of 786 pages, contains an authoritative and complete discussion of the present status of exploration geophysics by one who is an acknowledged master in the development and use of geophysical methods. Issued in late 1940, it has already found wide acceptance as a textbook and reference book on the subject. The original subject matter is based upon lectures delivered at, and the manuscript submitted to, the faculty of the College of Mines and Engineering of the University of Arizona in 1933. The chief object of the book is to describe the fundamental theories, equipment and field technique of the recognized exploratory geophysical methods, and to illustrate their application to problems of economic geology. The dynamic condition of the art necessitated continual revision of the manuscript during the period of its preparation. After final compilation each chapter was submitted to reviewers who had extensive experience in the particular phases of geophysics treated in that chapter. In practically all cases the reviewers reworked portions of the chapter or added new material, in which case due credit is given. Opening with the history of the development of the various methods and a discussion of contemporary workers in present developments, as well as trends in development of future methods, the work progresses to a discussion of the geologic and economic background of exploration geophysics. Chapters are devoted to each of the methods as follows: Magnetic methods; gravitational methods; electrical methods, including a chapter on potential and resistivity methods and a chapter on magnetometric and inductive methods; seismic methods; geochemical methods; geothermal methods, and concluding chapters on drill hole investigations (bore hole methods); physical principles applied to production problems; and common permit and trespass practices, and insurance.

The author has a long record of experience in the development and application of various geophysical methods. He not only knows his subject thoroughly but he presents it in a competent and authoritative manner.

ELEMENTS OF MINING. *Second edition, by Robert S. Lewis, E.M., Professor of Mining, University of Utah. Published by John Wiley & Sons, Inc., New York. Net price, $5.50.*

The first edition of Professor Lewis' "Elements of Mining," issued in 1933, has been widely accepted as a text and reference work on mining. Developments in the art of mining since that time have necessitated this revision, which includes late developments on such problems as support in deep workings, maintenance of workable conditions where rock temperatures are high, single stage hoisting to great depths, the control of mine dust and its hazards, the introduction of detachable bits in many places superseding sharpened drill steel, the increasing attention paid to the health of miners by management, and other equally important and pressing phases of operation.

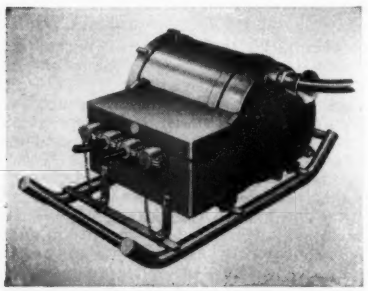
The work is divided into 15 chapters, with headings as follows: Introduction to the Mining Industry; Prospecting; Mining Law; Subsidence and Support of Excavation; Explosives; Drilling and Blasting; Shafts; Hoisting; Mining Methods; Mine Haulage; Mine Drainage and Pumping; Compressed Air; Ventilation; Sampling and Valuing Mines; and Organization Management and Safety Work. Each chapter has a complete bibliography of the subjects covered.



MANUFACTURERS' Forum

New Gas-Proof Multiple Distribution Box

The Ohio Brass Company, Mansfield, Ohio, announces the development of a new gas-proof multiple distribution box bearing the approval plate of the U. S. Bureau of Mines. The device, designated as the Type GM Distribution Box, is designed for use in permissible working areas. It consists of a gas-tight compartment containing a double pole disconnect switch and a fuse panel, and a plug compartment containing four 3-conductor rubber plugs. The lid of the plug compartment, as well as the



screw cover of the gas-tight compartment, is interlocked with the switch so that it is impossible to remove a plug or change a fuse with the power on. When the cover is off the switch is in open position and is inoperative.

The GM Distribution Box provides a safe and convenient means of connecting and disconnecting face circuits to conveyors, blowers, drills, hoists, cutting and loading machines. It also provides positive overload protection for each of the four circuits. One plug circuit is arranged for a 300-ampere fuse. Two are arranged for 60-ampere fuses. The fourth circuit is arranged for a 30-ampere fuse.

The switch handle and the rubber plug bodies are completely insulated. Entrance clamps grip each outgoing circuit so that strain is not transferred to the plug connection itself. These clamps conveniently lift from their position in the case when plugs are removed from receptacles. Two additional entrance clamps without openings are provided so that dust and dirt cannot enter the plug compartment when entrances are not in use. Each plug body has three bronze contact plugs, positive, negative and ground, arranged in such a manner that it is impossible to insert them improperly or into the wrong set of receptacles.

The cover of the gas-tight compartment is screwed to the body by means of standard V-threads, confining any possible explosion to the interior of the case. Cables enter the casing through flame-proof packing glands. A short length of No. 1, 3-conductor cable, properly connected to terminals in the case, is furnished for the incoming power leads.

High Wattage Lamps Introduced

A new type high-wattage lamp, just introduced, will enable mine and quarry operators to increase their illumination up to 250 percent or more without changing fixtures. The use of a hard glass bulb has made it possible to reduce the size of a 500 watt lamp to that of an ordinary 200 watt lamp, and also permits the lamp to withstand thermal shocks when used outdoors. The lamp was originally designed for use in explosion-proof fixtures.

Former attempts to reduce the size of high wattage lamps resulted in melting of the bulb or collapse of the filament support, due to the intense heat developed. In place of the large "mogul screw" base and heavy fixture necessary to support the weight of an ordinary 500 watt lamp, the new lamp made by the Radiant Lamp Corp., 265 Sherman Avenue, Newark, N. J., can use a "medium screw" base like those in ordinary household fixtures. Unlike conventional lamps, the hard glass Radiant Lamp is said to withstand the sudden shocks of rain or sleet without cracking. Other size industrial lamps up to 10,000 watts are now being made to meet special requirements in various industries.

Neutral Grounding Resistor For Shovel Service

A line of noncorrodible neutral grounding resistors for outdoor service, designed particularly for applications where dirt, fumes, and extreme weather conditions are encountered, has been announced by the General Electric Company. Among the applications of such resistors is grounding the neutrals of transformers supplying power to shovel sets.

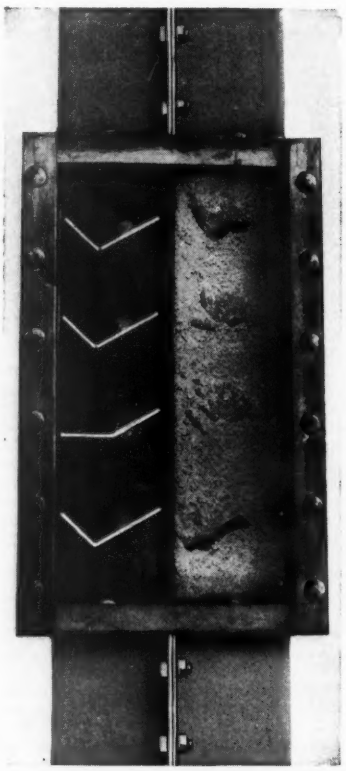
The resistance element, of special stainless-steel alloy, is corrosion-resistant, mechanically strong, and tough; suitable for operating temperatures up to 750 degrees Centigrade above ambient; and is edgewise-wound in the form of a helix. A large factor of safety is provided against burnouts. The specific heat of stainless steel is approximately 50 percent higher than that of cast iron, and radiation at 790 degrees Centigrade is much greater than from a cast-iron grid operating at a maximum of 540 degrees Centigrade.

The resistor units are mounted on strong, heat-resistant, noncarbonizable, ceramic-type insulators.

New Bulk Conveying System, Is Announced By Link-Belt

Proved by actual installations, handling a wide variety of materials, Link-Belt Company, Philadelphia, Chicago, San Francisco, now announces for the first time that it has developed Bulk-Flo—a distinctly new and different power-operated conveyor system for the positive and continuous conveying of flowable granular, crushed, ground or pulverized materials of a non-corrosive, non-abrasive nature, in capacities of one to 140 tons per hour.

It is pointed out that Bulk-Flo is of low first-cost, being exceedingly simple and compact, and requiring but the minimum of supporting structure; is self-feeding and clearing, needing no separate feeder; operates slowly within a dust-tight casing;



moves the material gently and quietly; and requires relatively little power for its operation.

The conveying medium employs a specially designed chain, usually made of malleable iron, to which solid peak-top flights are rigidly attached at every pitch. These divide the material in the conveyor duct into a continuous series of batches, which are moved *positively* by the peak-top flights, whether there be full load or only a partial load.

Bulk-Flo elevating, conveying units may follow almost any desired path—horizontal, inclined, vertical or curvilinear, and a single self-contained unit may carry in all these directions in the same vertical plane.

They may be fed or loaded at various points to suit conditions. Feed and discharge openings, also openings for inspection and access, are readily provided in the conveyor casing according to the dictates of the individual installation.

Great stress is laid on Bulk-Flo's compactness, permitting installations to be made in confined quarters. Bulk-Flo requires approximately one-fifth the cross section of a bucket elevator of corresponding capacity, one-third that of a belt conveyor, and about one-fourth the cross section of a flight conveyor. This, because it is possible for the material moved to occupy the maximum of the cross-sectional area of the conveyor duct.

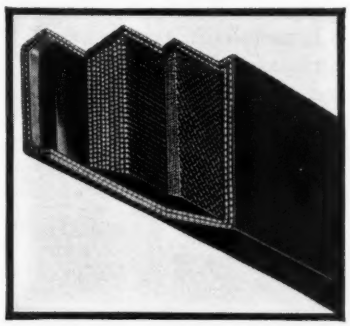
Bulk-Flo, it is said, loads itself uniformly and gently from hoppers, bins or chutes, without flooding or overloading. This ability to load itself obviates the need of a separate feeder, thus saving not only the cost of such a feeder but also the added expense of extra supports and additional foundation work.

In a Bulk-Flo layout, one continuous conveyor often may serve where several units of other types would be required.

"Super 7" V-Belt Now Available

Allis-Chalmers Manufacturing Company, Milwaukee, Wis., pioneer in the field of multiple V-belt transmission, has again made fundamental improvements in V-belt structure. It announces that all its Texrope V-belts are now of the new "Super 7" laminated design, based on the Vogt formula and abundant field experience, to include more strength and flexibility, greater service and longer life.

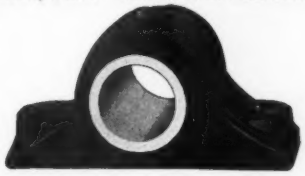
The cords in the new "Super 7" belts are smaller, permitting the use of more cords per belt with a resulting greater strength and less stretch. Each cord is individually imbedded in heat-dissipating rubber to reduce internal belt degeneration. These belts are made in matched sets to assure uniform, smooth running, highly efficient drives. Each element of the belt is designed to fulfill an individual function. The live rubber bottom



cushion absorbs the ceaseless impacts of operation. The central cord portion transmits power at the effective pitch diameter. The bias-cut fabric prevents "dishing" and assures transverse stability. The 2-ply rubber-impregnated fabric cover prevents destructive agents from reaching the vital belt elements, resulting in a high grip co-efficient between belt and sheave walls.

Journal Bearings Carried in Stock

A new and improved line of solid and split journal bearings, carried in stock and neatly cased and labeled for prompt delivery, is announced by The Jeffrey Manufacturing Company, Columbus, Ohio. Of accurate dimensions



with modern rounded lines and smooth gun metal finish, these precision-made bearings have machined bases and faced ends. Height to center line of shaft is rigidly maintained. The babbitted bores are broached to smooth, hard surface and require no "wearing in."

Both styles are tapped for grease cups or pressure fittings. An ample storage groove in the top provides proper distribution of lubricant. In addition, the split bearing has feeder grooves on each side. Individual containers are furnished for easy handling and protection in shipping.

Semi-Magnetic Starters For Mining Service

Designed especially for mining service to furnish low-cost means of starting and stopping, a new d.c. semi-magnetic motor starter is announced by Westinghouse Electric and Manufacturing Company. For use on motors, driving pumps, and compressors, these 1- to 15-hp. starters also provide overload and circuit protection on 230-550-volt d.c. lines.

The starter consists of a sheet steel enclosure containing one single-pole,

600-volt, 60-ampere, front operated "quick make" and "quick break" De-ion line switch, a small ebony asbestos panel, an accelerating contactor, and a resistor.

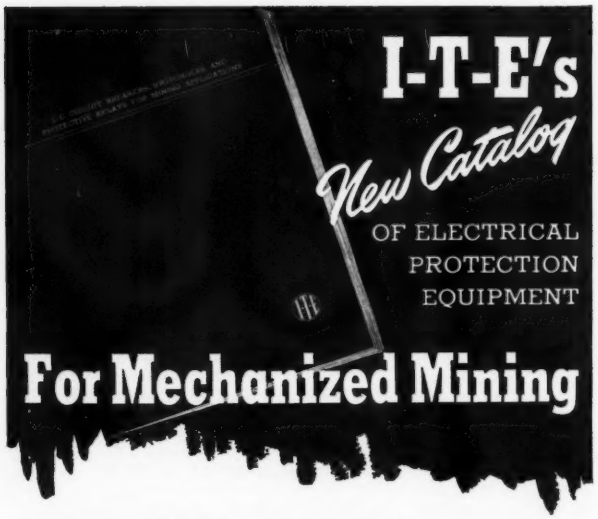
In operating, when the switch is closed the motor is started with a resistor in series with the armature to limit the starting current. The accelerating contactor coil is connected across the motor armature. As the motor accelerates, the voltage across the armature increases and causes the accelerating contactor to close at the proper time, short circuiting the resistor and connecting the motor across the line.

New High-Speed Mobile Crane

Combining the speed of a Tournapull and the lifting power and maneuverability of a tractor crane, R. G. LeTourneau, Inc., Peoria, Ill., introduces the Tournacrane—another money-saving tool for industry.

Boom lengths of 20, 30, and 40 feet and a lifting capacity of 10 tons fit the Tournacrane to a wide variety of jobs—unloading flat cars, erecting steel, stacking material in warehouses, placing concrete reinforcement on paving jobs and similar handling of large, awkward and heavy loads.

Tournapull traveling speeds, up to 14 miles per hour, shorten times between widely separated jobs and extend the work range of the Crane. Rubber tires and narrow width make fast movement over highways and concrete surfaces possible. Tournapull two-wheel maneuverability enables the Tournacrane to work in extremely close quarters and over rough terrain.



The new I-T-E Catalog No. 2502 is a complete description of d-c circuit breakers, switchgear and protective relays for mining applications. Its completeness recommends it particularly to those who are engaged in or contemplating mechanized mining.

Send for your copy on your company letterhead.

I-T-E CIRCUIT BREAKER CO.
PHILADELPHIA, PA.

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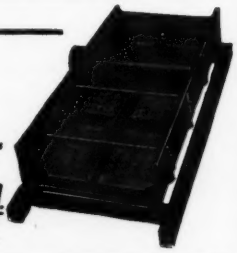

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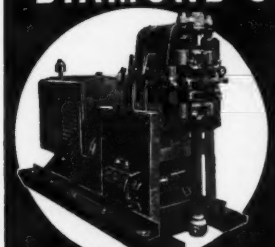
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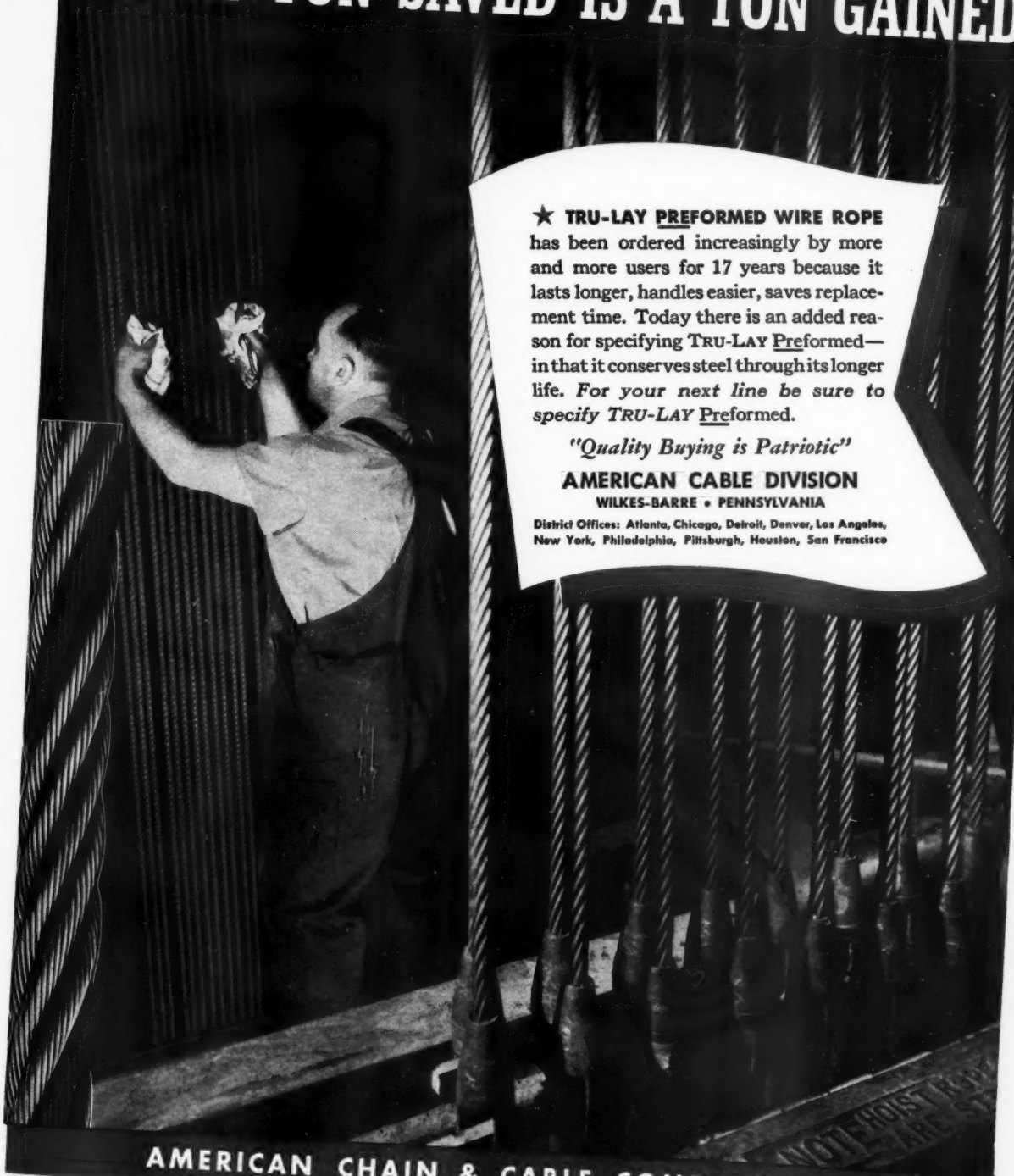
EVERY TON SAVED IS A TON GAINED



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